THE EFFECTS OF NORMATIVE INFLUENCE AND RISK CONTENT ON ONLINE GROUP DECISION-MAKING

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THE EFFECTS OF NORMATIVE INFLUENCE AND RISK CONTENT ON ONLINE GROUP DECISION-MAKING

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This study looked into the effects of group identity and subject content on computer-mediated group and individual decision-making. Drawing from traditional choice shift literature, it examines the concepts of choice shift and group polarization in an online setting. It focused on online decision-making and examined whether normative influence is a factor in online opinion change. In doing so it also looked at the effects of group identity as well as the effects of content on group and individual decision-making. In particular, the purpose of this research was to examine (a) the effect of normative influence on individual and group decision-making; (b) the effect of consensus on individual decision-making and; (c) if the nature of the issue being decided had an effect on group and individual decision-making. Using multilevel mixed models, findings from this study indicate that the nature of the content being discussed affected decision-making and opinion change, with there being a significant difference between intellectual issues as opposed to risk and moral issues. Another finding is that gender interacted with identity as well as content on decision-making. This research also suggests that group polarization may occur differently in naturalistic computer-mediated group settings, contrary to what has been shown previously in the literature. It suggests that previous studies have overlooked the temporal factor in the deindividuation process. This study increases our understanding of how content and gender affect group decision-making in CMC, and has advanced

our understanding of the impact of group identification on the decision-making process. Further research needs to explore other factors that affect online group decision-making such as temporal factors and the social and psychological processes that are activated when different types of content, in particular risk content is being discussed.

BIOGRAPHICAL SKETCH

Tracy Loh was born in Singapore and educated in Singapore, England and the United States of America. She received a Bachelor of Arts in Mass Communication and Sociology from the National University of Singapore, a Master of Science in Sociology from the University of Bristol, England as well a Master of Communication Studies from the Nanyang Technological University, Singapore. She has just completed her Doctor of Philosophy from Cornell University, USA. Her research interests lie in breaching the boundaries between sociology and communication.

Before entering academia, Tracy has also spent many years working in the fields of advertising, public relations and marketing communications. Her experience lies mainly in the hospitality and food and beverage industries as well as in the music industry.

I dedicate this dissertation to my family, in particular to my mum.

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CHAPTER 1

INTRODUCTION

The genesis for this research emerged due to a fascination with the way that people communicate online, in particular the communication that occurs within the proliferation of online bulletin boards and social support groups and how it affects the decisions that people make. Hence, this study looked into the effects of computer-mediated communication (CMC) on group and individual decision-making. Of particular interest is the making of decisions where the content under discussion has an element of risk attached to it, as well as the impact of normative influence and group identification on the decision-making process.

The plethora of information available online and the convenience of being able to conduct research in the comfort of one's own home has led many people to turn to the Internet as a primary source of information or to supplement existing information sources. According to a survey conducted by the Pew Internet and American Life Research, the two most popular uses of the Internet are for obtaining information and for communicating with others. In December 2007, 75% of Americans used the Internet, out of which 92% used it to read or send email and 91% used it to search for information (Pew Internet Project, 2007).

Of particular interest is the change in the way that people obtain health and medical related information. Health searches are now as popular an online activity as paying bills online or reading blogs. In an August 2006 survey, 80% of Internet users or some 113 million Americans said that they had gone online to search for health or medical information (Fox, August 2006). On a typical day, 7% of health seekers, or about 8 million Americans search for information on at least one health topic. The

information found online has affected the decisions that people make towards the treatment of their illnesses. Fifty-eight percent said the information they found in their last search affected a decision about how to treat an illness or condition, 55% said the information changed their overall approach to maintaining their health or the health of someone they help take care of, 54% said the information led them to ask a doctor new questions or to get a second opinion from another doctor. Thirty-nine percent said the information changed the way they cope with a chronic condition or manage pain and 35% said the information affected a decision about whether to see a doctor (Fox, 2006).

Unfortunately amidst the cornucopia of information, very few people bother to check on the veracity of what they find online. Just 15% of health seekers said that they "always" checked the source and date of the online health information that they found, while another 10% said they did so "most of the time." Fully three-quarters of health seekers said they checked the source and date "only sometimes," "hardly ever," or "never". This means that about 85 million Americans are gathering health advice online without consistently examining the quality indicators of the information that they find (Fox, 2006) .

Websites are not the only places online where individuals can go in search of information. Countless discussion lists and bulletin boards have sprung up where individuals can share their knowledge, exchange information, as well as seek and give social support. In 2001, 90 million Americans used the Internet to make some sort of contact with some type of online groups e.g. trade/professional groups, hobby/interest groups, community groups, support groups) and on average, each user made contact with four different online groups (Horrigan, Rainee, & Fox, 2001). In 2002, taking part in an online group was a daily activity for approximately 4.1 million Americans (Pew Internet Project, 2004).

Thus, not only are people going online to find information, they are also going online to seek out like-minded others, to bond with and to share similar experiences with others. Research has shown that these online communities are vibrant and as real psychologically to their participants as their offline counterparts, even though the participants of these online communities are geographically dispersed and might have never met each other in real life. The amount of attachment and attraction that the participants feel towards these groups are similar to their traditional offline counterparts. Braithwaite, Waldron, and Finn (1999) have found that online support groups featured all the categories of traditional social support groups, such as information, esteem, network, and emotional support, with participants sharing highly personal stories.

The assistance and support rendered online can be unstinting and generous, as can be the empathy. Many of these social support groups are focused around health issues and offer both practical and emotional advice and support. These support groups can take the form of informally organized peer discussion groups which mainly consist of patients, prospective patients, former patients, or relatives of patients (Preece & Ghozati, 2000; Walther & Boyd, 2002). At times, the advice given by these online support groups might often appear to be more relevant and germane to a patient than those given by the medical establishment. Due to the influence of homophily, which is the perception of similarity between individuals, online support groups might impact the way that individuals perceive the information that they receive in a different manner than would information received from another source, such as from an expert (Walther, Wang, & Loh, 2004).

One reason might be because of the existence of embedded knowledge. As opposed to medical professionals who have credentialed expertise, participants on these forums and lists have embodied knowledge, that is, their knowledge is a result of

a direct experience with the disease, treatments or social situations. They are also familiar with the various formal and informal sources of information (Walther et al., 2004). These numerous support groups and chat groups have put people in contact with a variety of sources of information that they would not have had access to a decade or more ago.

Rodgers and Chen (2005) have found that discussion boards not only drew individuals from diverse demographic backgrounds, but also brought together individuals from diverse geographic locales. In addition, online communities seem not only rich in storing medical information and knowledge about various illnesses and disease but also possessed an intimate knowledge regarding the diseases, such as emotional responses and coping strategies. In their study on the effects of participation in a breast cancer discussion board, they found that participants in online discussion boards gained many other psychosocial functions—such as social support, increased skill or ability to cope with the disease, improved mood, decreased psychological distress, and strategies to manage stress—apart from just the informational ones. Similarly, Preece and Ghozati (2000) have found that women used the Internet and online communities for both emotional support and factual information.

There is however, a dark side to the plethora of help offered. At times, the online postings and suggestions disdain modern medicine in favor of alternative remedies such as folk or traditional medicine in the treatment of ailments. Individuals might decide to supplement conventional medical treatment with alternative medical treatments, which might be detrimental to their health or eschew conventional treatments for these alternative treatments. They may decide to subvert the medical advice given by doctors and other medical professionals and follow alternative approaches, which are deemed dangerous by medical professionals. These alternative treatments run the risk of having a potential harmful interaction with modern medicine

and in those cases where alternative treatment is adopted in lieu of modern medicine, the consequences might be fatal. It might also lead more people to choose to self-diagnose and self-medicate using a combination of the medical information found online to self-diagnose and then choosing to self-medicate using the online pharmacies (Fox, Ward, & O'Rourke, 2005).

These speculations have been partially borne out by Rodgers and Chen's (2005) analysis. Their study revealed that information about treatments and medications (anti-depressants and anti-nausea medications) are exchanged fairly extensively, and they have come across a number of cases where the women on the discussion boards used the information learned from other members of the group to inform their own decisions about treatment, medications and so on. For health practitioners, this could be posed as a challenge as their authority and expertise will constantly be cross-validated by the community members online. Rodgers and Chen commented that physicians might have to therefore spend time on these online communities in order to provide "expert" testimony and to debunk myths about potential treatments that may help speed up recovery. On the flip side, these communities might also provide a good opportunity for health practitioners to learn about the psychosocial needs of their patients.

Significance of this research

Given the pervasive influence that the Internet has on our every day lives, this online interaction as well as the advice obtained might have an effect on people's decision-making. The example given above is just one example of the myriad ways that the Internet has changed the ways that people within groups relate to one another and to the group, as well as the way that they gather information. It is therefore of

interest and importance to examine the decision-making process of individuals who engage in online discussions. A lot of the group decisions that were once made face to face (FTF) are now moving online and it is of growing importance to examine how CMC might affect the decision-making process.

A well-documented position in the social science literature is that people making decisions in groups have a tendency to make riskier decisions than when they make the same decision as individuals. When people are deliberating with like-minded others, there is a tendency for views to become reinforced and under some circumstances, this may result in the development of extreme views. This movement or tendency of a shift towards more extreme views is not bad in and of itself, but may have a detrimental effect in a number of conditions. For example when radical views on race, politics or sexual orientation such as those espoused by hate groups are reinforced and promulgated, or as seen in the earlier example, when alternative medical treatments are advocated in lieu of modern medication.

The ways that CMC and group decision-making work online can have implications not only on the personal level as mentioned above but also on the organization as well on the societal level. In today's global world where business deals cut across geographic and national boundaries, many organizations nowadays need to utilize computer-supported collaboration tools to work not only within the organization itself but also with business associates across the globe. The benefits that these organizations reap as well as the costs that they might incur from the use of CMC and online collaboration is highly dependent on the group's composition as well as the group's goals.

There are critical and crucial differences between computer-mediated communication (CMC) and face-to-face communication (FTF), with the main characteristics of online communication being visual anonymity and reduction of

social cues. These factors work together to make CMC different from FTF in various ways. For example, CMC can affect feelings of belongingness to the group as well as a sense of group identity in the minds of its members. As such, this might affect the amount of conformity to the group norms.

CMC can be used to decrease the effects of having a geographically dispersed team. These teams might use CMC to augment the exchange of personal information among the geographically dispersed group members. Research has shown that dispersed teams tend to develop subgroup identities based on location and that these subgroup identities function as in-groups and out-groups, causing biased attributions against out-groups (Cramton, 2002). If so, sharing more personal information about remote team members might reduce subgroup tensions by discouraging group-based perceptions. This might be especially beneficial for newly formed teams where the members do not know each other and there are few shared goals or group boundaries. On the other hand, groups with well-defined boundary and shared goals might want to promote group-based thinking by allowing the anonymity of online communication to foster sub-group identification with fellow group members. Organizations might benefit instead from group polarization due to innovation and entrepreneurship via the encouragement of risk-taking behavior (Lee, 2007).

On a societal level, the Internet has also been known to have a mobilization potential. Studies have shown that individuals and groups have utilized the Internet to push forth social action and the Internet has served to unite people globally. The use of information technologies has dramatically influenced the non-governmental sector and civil society. It has led to changes and dispersion of membership across space and time (Shumate & Pike, 2006), changes in the media's coverage of an event, especially with the rise of citizen journalism (Downing, 2001) as well as changes in the way that protests are organized (Scott & Street, 2000).

Increasingly, information technologies are providing new ways for organizations to cooperate with one another (Shumate & Dewitt, 2008). CMC has enabled a greater audience to be reached, and thus potentially increases the number of people who can be mobilized. By posting information about their cause online, as well as by joining or hosting discussion boards and mailing lists, activists can enlarge their circle of supporters and increase their critical mass. The use of email lists and bulletin boards also helps organizations to reach out to those already sympathetic to the movement, or within similar networks. This would also enable them to reach out globally and to join forces as well as exchange resources with similar groups and like-minded others internationally. For example, Friends of the Environment has been able to encourage online activism and new members to join their cause via its website, while Lyminge, another environmental group has succeeded in raising its profile and campaign to save the Westwood Forest, attracted new visitors and established international links via CMC (Pickerill, 2001).

Hence it is now common to find interest groups with members from all over the world corresponding with each other. Individuals can come together online to discuss the newest drug trial, to organize an international protest or vigil, or to discuss whether or not to a nuclear power plant should be built near a particular town or in a particular area. Similar to online social support groups, these special interest groups are often made up of many anonymous geographically dispersed individuals who might never meet in offline. In chat rooms and discussion groups on controversial topics, people tend to remain anonymous with little, if any personal information revealed. Also as participants get exposed to the arguments supporting both sides, anonymity might highlight the contrast between those who are in agreement with us, effectively forming an in-group as opposed to those who hold differing view, i.e. the out-group. There is therefore the formation of an "us versus them" distinction. Under

these circumstances, the individual might become more likely to polarize their opinions, both to proclaim their issue standing more clearly to the in-group members and to distance themselves further from the out-group. In such cases, online discussions might amplify the division between social groups holding different views, rather than serve as a tool for building public consensus through the exchange of reasoned discourse (Lee, 2007). It would therefore appear that in the CMC settings of bulletin boards and chat rooms, if the group identity is strong, communication online might lead to greater group identification and conformity to the group norms. Hence it is a possibility that when groups make their decisions via CMC as opposed to being in a FTF environment, this would result in the heightening of social norms which might have important repercussions on group dynamics, particularly on a group's tendency to make more extreme group decisions.

As stated before, websites, bulletin boards and chat rooms have the potential to bring together diverse peoples and influence views and opinions. Therefore, the Internet and CMC might also affect the ways that people think about and perceive the risks encountered. This would also in turn affect the way that various risks are treated in society. To date, most of the current work looks at the decision-making process as a rational process, but research from the risk literature tells us that people perceive and react to risk in a very different way than they do to other issues. Risk perception is inherently subjective (Slovic, 1987). The layperson and the expert view risk very differently. For the layperson, if there risk pertains to something that is important or if the risk is unknown or dreaded, rationality takes a backseat when it comes to one's ability to tolerate the amount of risk (Slovic, 1992).

As such, when it comes to decision-making concerning risk, there is the greater use of the affect heuristic when making judgments. This form of decision-making appears to utilize a different process that that of rational decision-making. Research

therefore needs to be conducted to look at the effect of risky issues on decision-making, in particular, the effect of risky issues on decision-making in a computer-meditated environment. It would therefore be important and interesting to find out if the content or type of the issue under consideration would make a difference to the decision-making process and if it does, what sort of differences would it make.

This study therefore sets out to examine the effects of group identity and issue content on online decision-making. The next chapter examines the relevant literature and puts forth the research questions and hypotheses that drive this study. Chapter 3 lays out the methodology while the data is analyzed in relation to the hypotheses in chapter 4. Chapter 5 contains the further analysis, which looks at other interesting findings in the data, and the dissertation concludes with a short discussion in chapter 6 that relates the data back to the current literature.

CHAPTER 2

LITERATURE REVIEW

This study looks at how being in a group affects individual and group decision-making. In light of the extant literature, it is important to understand how people behave in groups online. Of particular interest is the question of how people make decisions as a result of being in an online group or participating in an online group discussion, as well as the effect of content on online group and individual decision-making. This chapter begins with an overview of the relevant literature on choice shifts, computer-mediated communication and risk perception and proceeds to set out the research questions and hypotheses that guide this study.

Choice Shift Theories

Groups have a tendency to make more extreme decisions than what its individual members would have made and individuals may agree to more extreme positions after having been in a group discussion than they would have agreed to a priori (Levine & Moreland, 1998). In such situations, the initial tendencies of the individual members of the group towards a given direction are enhanced. This phenomenon is known as choice shift and is an extension of the frequently documented risky shift phenomenon, that is, the tendency for groups to make more risky decisions than what its individual members would have made. Cautious shifts do occur as well, albeit less frequently and are often of a lesser magnitude than risky shifts (Hogg, Turner, & Davidson, 1990; Isenberg, 1986; Mackie, 1986; Moscovici &

Zavalloni, 1969). The term choice shift refers to the difference between the arithmetic mean of the individual's pre-discussion preferences and the group decision.

A closely related phenomenon to choice shift is that of group polarization, which is defined as the movement of individual opinions, following group discussion, toward and beyond the initial group mean (Myers & Lamm, 1976). It denotes the differences between the pre-discussion preferences and the individual first preferences after the group discussion i.e. the post-discussion preferences (Hinsz & Davis, 1984; Kaplan, 1987; Kaplan & Miller, 1983). In group polarization, mean post-discussion responses to an issue reflect the adoption of attitudes that are more extreme than, but in the same direction as, the group's mean pre-discussion position.

Choice shift and group polarization need not, however, be of equal magnitude. Therefore, it is important to distinguish between the shift that occurs at the group level (choice shift) and that which occurs at the individual level (group polarization). Contrary to many contemporary treatments, these two levels should not be considered equivalent (Zuber, Crott, & Werner, 1992).

To measure choice shift and group polarization, the first researchers employed the use of a set of decision problems. When they compared the level of risk displayed by groups after discussion of these problems to the individual level of riskiness displayed by the members prior to the discussions, they found that groups would make more risky decisions than individuals, taking the problem set as a whole. This was termed the "risky shift" (Wallach, Kogan, & Bem, 1962). However, other scholars found that groups usually shift in the direction of caution on two of the problems in the original set[1] (Brown, 1965). Other researchers have also been able to write additional items that cause the group to shift towards caution (Fraser, Gouge, & Billig,

[1] One problem involves the chances of success in building of a new plant abroad and the other deals with the chances of success in a marriage.

1970; Rabow, Fowler, Bradford, Hofeller, & Shibuya, 1966; Stoner, 1968). Hence, the term "choice shift" was considered to be a more proper term for this phenomenon, as opposed to the original term of "risky shift" (Pruitt, 1971).

Although effect of choice shift and group polarization have been widely documented, there has been some debate as to the underlying processes that account for this shift. Some social psychological explanations have suggested that social comparison is responsible for the shifts (Brown, 1965), whereby group members compare themselves with each other in an attempt to occupy the socially valued extreme positions in the group, and that extremity is a socially valued position in its own right. Others have proposed that the change occurred as a function of the arguments exchanged, and that information influence is its source (Burnstein & Vinokur, 1977). Reviews have concluded that both types of influence are to some extent involved (Isenberg, 1986), and that the predominance of each mode of social influence is determined by contextual factors such as the type of issue under discussion (Kaplan & Miller, 1987). Research into choice shift and group polarization has spawned hundreds of studies in the 1970s and researchers finally came to the consensus that out of all the myriad explanations for this phenomenon, the evidence that came out of this showed that two major processes were at work: social comparison processes and persuasive argumentation. For that reason, the rest of this section will concentrate on these two explanations.

Social comparison processes.

The social comparison hypothesis is based on the importance of the prevailing cultural values and predicts that any action that allows one to discover either implicitly or explicitly others' positions on an issue leads to a choice shift, with the direction of the shift dependent upon the way that others respond (Mayer, 1985). So long as there

is a way for group members to make comparisons, this would result in a choice shift. Thus an exchange of decisions would be sufficient to produce the choice shift, as would a discussion.

Brown (1965) developed one version of the theory known as "risk-as-value" social comparison theory. Brown postulated that riskiness is a culturally prescribed value or ego ideal, which causes the typical American to want to be at least as risky in his behavior as other people similar to him. This implies a social comparison process in which the individual tries to figure out where other people stand on the decision problem that he is facing, and then, chooses, as his initial decision, a level of risk that is at or above what he assumes to be the group average. The theory also explains cautious shifts in terms of a value on caution which impels people in some problems to be equally or more cautious than the group average. Currently, support for this theory is mixed at best.

Jellison and Riskind (1970) came up with another version of the theory, the social comparison of abilities theory. They tested the hypothesis that people would attribute greater riskiness to another as a direct function of the other's ability, and hence the risk level taken by a person would be interpreted as an index of his ability. They postulated that people see risk taking as a sign of ability and hence the more risk that the individual undertakes, the greater the ability possessed. Hence, people who are motivated to demonstrate their ability would take higher risks than people who are not so motivated. People also tend to view themselves as more capable and as having a greater likelihood of success than others. This is derived from Festinger's (1954) theory that people wish to see themselves as having slightly more ability than others with whom they compare themselves against. Combining the above with the view of risk as ability, thus when a person learns that the level of risk that he has taken is below the group average, he infers that his ability is less than that of other group

members. This leads him to raise his level of risk, thus producing the risky shift. Studies have supported the hypothesis and the idea that ability and risk taking are perceived as closely related. Participants expected their peers to take lower risks than themselves and that the most admired risk preferences were higher than their own (Jellison & Riskind, 1970). Clark, Crockett and Archer (1971) too found support for the risk-as-value hypothesis. In their study, a greater risky shift was found among those subjects who perceived themselves to be at least more willing as their peers to take risk.

Another explanation, is that of pluralistic ignorance which assumes that decision-making in many areas is guided by a "conflict-compromise" process (Levinger & Schneider, 1969). The conflict is between an ideal preference, which is what the individual would really like to do and an assumed group standard, which is what the individual thinks other people favor. Such a conflict leads to a choice of a compromise position that falls part way between the individual's ideal and the assumed group standard. In a group discussion, if it is shown that other members of the groups favor a position that is closer to the individual's ideal, the individual will shift his own position towards his ideal, thereby demonstrating a choice shift. This shift can be towards risk or caution. What is important is that individuals do not realize at first how widely their values are shared. Under such circumstances, discussion brings to light that there was greater social support for risk taking or caution than what was anticipated and this allows the individual to shift his position accordingly. In general, people tend to assume that the group standard as relatively more cautious, and believed themselves to be riskier than their peers. In addition, it has been found that people perceive their ideals as riskier than themselves, indicating that risk taking is a valued trait.

In summary, social comparison and pluralistic ignorance both take the view that individual group members respond to what they perceive to be the average level of risk taking among the other group members. Social comparison theory holds that the individual will try to be at or above this average while pluralistic ignorance holds that the group experience causes the individual to rethink his assumptions about group standards and act accordingly.

Persuasive argument hypothesis.

The persuasive argument hypothesis is based upon the idea that the provision of additional information or novel arguments could change or sway an individual's decision. An individual's choice is dependent on the number of arguments presented as well as the persuasiveness of the arguments for and against a certain decision that the individual recalls when formulating his position. Choice shifts are seen as the result of the advancement of novel arguments and should occur in the direction of the preponderance of the arguments used in a discussion (Silverthorne, 1971). Ebbeson and Bowers (1974) found that the proportion of arguments expressed for a position correlates highly with the direction of the shift. Vinokur and Burnstein (1974) found that the pool of arguments and the number of arguments generated by the individuals and groups were in the direction of the choice shift. They also reported that individuals perceive arguments favoring the direction of the eventual choice shift to be more persuasive than arguments in the opposite direction. Vinokur and Burnstein (1974a) also reported that novel arguments tend to be more persuasive than familiar arguments. Exposure to others' discussions produces shifts in the direction of the arguments advanced in the discussion (Clark & Crockett, 1971; Kogan & Wallach, 1967a; Lamm, 1967). Clark and Crockett (1971) found that persons biased towards

either risk or caution changed in the direction advocated by discussants who opposed their initial positions.

Thus far, a review of the literature has found mixed support for both explanations of choice shift. Mayer (1985) in comparing several reasons of choice shift found most support for the persuasive argument hypothesis, followed by minimal support for the social comparison hypothesis. Isenberg (1986) in his meta-review of the group polarization literature suggested that social comparison and persuasive argumentation occur in combination to produce polarization, although persuasive argumentation effects tend to be larger. However, as research into choice shift was mainly conducted in the 1970s before the advent of the Internet, there have been very few studies conducted that has looked into the effects of this new medium on the choice shift phenomenon. The next section reviews the literature on CMC and how it might have an impact on this phenomenon.

The Effect of Computer-Mediated Communication

Extant research has examined choice shifts and group polarization in the realm of decision-making within small groups. There have been relatively fewer studies as yet that look at the effects of CMC on choice shifts in group decision-making. CMC lacks the social cues of FTF communication, and this has implications on the way that individuals perceive of themselves in relation to a group, which in turn has implications on the making of judgments and decisions. As such, the Internet and CMC may affect risk perception and risk judgments by means of the way that communication occurs online.

Studies that have looked at group polarization online has found that the medium has an effect on group polarization with there being greater polarization in

online groups as compared to FTF groups (Adrianson & Hjelmquist, 1999; Hiltz, Turoff, & Johnson, 1989; Kiesler, Siegel, & McGuire, 1984; Siegal, Dubrovsky, Kiesler, & McGuire, 1986; Sproull & Kiesler, 1991). Siegel et al. explained their results in terms of a lack of social norms and a lowered consciousness about the "others" while Adrianson and Hjelmquist suggested that reduced conformity and opinion changes in CMC were due to the effects of written communication, i.e. the lack of feedback and loss of nonverbal signals. These explanations were part of the reduced social cues approach to CMC in which most theories predicted that compared to FTF interaction, normative social influence will be reduced in CMC due to the absence of nonverbal cues. The absence of social and contextual cues in CMC encourages psychological states that undermine the social and normative influences of individuals or groups, leading to more deregulated and extreme (i.e. anti-normative) behaviors (Dubrovsky, Kiesler, & Sethna, 1991; McLeod, Baron, Marti, & Yoon, 1997; Sproull & Kiesler, 1991; Valacich, Jessup, Dennis, & Nunamaker, 1992).

This explanation appears to sit well with the 'persuasive argument theory' proposed by Burstein and Vinokur (1977) in which group polarization and choice shift can be seen as a function of the number of persuasive (i.e. novel) arguments favoring that already preferred pole to which one is exposed to during group discussions. It is argued that both the uninhibited behavior and the more equal participation characteristic of CMC facilitate the exchange of more persuasive arguments favoring the preferred pole. Removing social cues removes those social inhibitions or normative constraints that could act as a brake on the generation or articulation of extreme arguments, particularly by reducing or removing indicators of power, prestige or social status. The absence of social cues also leads to more equal participation of group members putatively facilitating the greater exchange of extreme arguments (Kiesler et al., 1984; Siegal et al., 1986; Sproull & Kiesler, 1991).

Sproull & Kiesler (1991) found that as a result of increased democracy, CMC users gave more proposals for action compared to members of FTF groups. Miranda (1994) found that there was less likelihood for groupthink to occur during computer-mediated discussions as more alternatives were put forward by the group. Anonymity was found to attenuate majority pressure in a group decision-making situation and when groups in an identifiable CMC condition were compared to those in the anonymous CMC condition, those in the anonymous condition contributed significantly more critical and solution-questioning comments (Jessup, Connolly, & Galegher, 1990). Sia, Tan and Wei (2002) manipulated the presence of verbal and visual cues to reduce social presence, and found that the removal of verbal cues did not reduce social presence sufficiently to impact group polarization but removal of visual cues resulted in greater group polarization. In another experiment, anonymity was manipulated and it was found that anonymity reduced social presence and thus increased group polarization. Sia et al. explained their results by way of the social presence argument in that decrease in social presence might have led to more uninhibited behavior which in turn led to increased one–upmanship and increased novel argument generation.

McGuire, Kiesler and Siegel's (1987) study saw that the CMC groups showed less of a choice shift than FTF groups did and they took this as support for the persuasive argument as the CMC groups contained fewer arguments than the FTF groups. However, the study employed a design in which both CMC and FTF groups were given the same amount of time to come to their decisions and current research has shown that it takes about 5 times longer to conduct a conversation via CMC than FTF (Walther & Parks, 2002). Hence it is most probable that should the CMC groups be given more time to conduct their discussion, the results would have been very different.

On the negative side, Kraemer & Pinsonneault (1990) found that compared to FTF groups, CMC groups found it more difficult to arrive at a consensus, taking a longer time and reporting lower satisfaction with the consensus. These findings have implications for health and risk in that greater disinhibition online might result in the advocacy and adoption of unconventional treatment methods on online social support groups and discussion boards. They could also result in skewed risk perception

Kiesler (1986) noted that disinhibition could also be a factor for the social comparison explanation for choice shifts and group polarization. Social comparison theory (Sanders & Baron, 1977) posits that changes results from conformity to a socially desirable but extreme norm that becomes publicly revealed only during group discussions. Thus this disinhibition associated with reduced social cues and anonymity presumably helps reveal more of this hidden norm, or pushes it further to the extreme.

The influence of group norms.

Recent studies appear to indicate that arguments for informational influence and persuasive arguments might be inadequate. Persuasive argumentation cannot account for the fact that according to Postmes, Haslam and Swaab (2005), during inter-group debates there is often evidence of bipolarization, i.e. the two groups were distancing themselves from each other attitudinally, even when arguments are shared among members of both groups (Postmes, Spears, & Lea, 2002). It is interesting to note that in some of studies, the magnitude of polarization varied considerably across conditions even when the content of the discussions was the same in all of them. For each of these findings, simple informational influence is an implausible explanation of such polarization. If members of two groups access the same information, bipolarization should not occur.

Similarly there is no reason why anonymity would enhance informational influence. If arguments are held constant, polarization should be of a similar magnitude. In fact, in certain contexts where there was increased group polarization, recall of the persuasive arguments was poorer (Postmes et al., 2002). This indicates that there are other factors coming into play that account for the polarization phenomenon besides that of persuasive arguments and that polarization is not due to attention to specific arguments and their novelty.

Thus, there appears to some other process at work rather than just social comparison and persuasive arguments. It is plausible that social comparison might be occurring whereby pluralistic ignorance is decreased. However, it is unlikely that polarization occurs due to the desire to be seen as extreme within the group. The Internet's unique characteristics of anonymity and deindividuation would dilute the impact of self-presentation as it serves less purpose to the individual.

Due to the nature of CMC, there might be another explanation for online group polarization—that of the influence of group norms. Members of the group are influenced by the group norm to make more extreme decisions. In CMC, under deindividuated conditions, where the social or group identity is more salient than the individual identity, it would be reasonable to predict that with the strengthening of group norms, group polarization would occur as a result of normative social influence as opposed to persuasive argumentation or social comparison. This line of argument dovetails with that proffered by the Social Identity Model of Deindividuation Effects (SIDE) which suggests that online communication with its offer of anonymity and lack of social cues rather than being the great equalizer, could under certain conditions, result in a group identification that is stronger than in a similar face-to-face situation and as a result, conformity to group norms is also stronger. In fact, polarization can be more extreme when group members are deindividuated and their

contributions are made anonymous (Kiesler et al., 1984; Postmes et al., 2002; Spears, Lea, & Lee, 1990).

Social Identity Model of Deindividuation Effects (SIDE)

Spears and Lea (1992) have suggested the social identity model of deindividuation effects (SIDE), incorporating aspects of deindividuation theory (Reicher, 1984) as well as social identity theory (Tajfel, 1978) to explain the effects of anonymity and social identification within CMC. Social identity theory and its extension, social categorization theory argues that individuals have multiple possible selves (Tajfel, 1978). The self not only encompasses one's individual identity, but also comprises social identities associated with valued group memberships. The self-concept may change from context to context when the situation makes different social identities salient (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). Social identity is closely tied to norms that define how group members should think, feel and behave. In a context in which group membership is salient, members will assign these norms to themselves, employing the attributes of their social identity to define appropriate conduct for themselves in the social context (Postmes, Spears, & Lea, 2000).

Based on social identity theory, Spears, Lea, & Lee (1990) proposed that under certain conditions, computer-mediated group communication could be deindividuating. Deindividuation denotes a situation in which there is a lack of individuating or personal information (Postmes et al., 2002). In a deindividuated state, attention is shifted away from that of a personal self-identity to a social self-identity (Postmes, Spears, & Lea, 1998).

SIDE relies on the assumption that CMC's lack of nonverbal cues filters out interpersonal and individuating information (Lea & Spears, 1992; Spears & Lea,

1992). In the absence of nonverbal cues, CMC participants use the remaining cues that signal common group identity as a basis of relating. Visual anonymity in CMC attenuates the perception of intra-group differences, which would otherwise individuate group members and undermine the salience of the group. It tends to depersonalize perceptions of self and others and encourages behavior that is normative when group membership is made salient (Spears & Lea, 1992, 1994). Contextual cues and the content of others' messages are not seen as individuating factors but are interpreted as signals that create or reinforce similarity within the group and as such, create and reinforce group norms. Therefore, in contexts in which individuating information is scarce such as in a CMC context, the individual's sensitivities to the salient social norms would be heightened. This results in an over-attribution process based upon stereotypical impressions of others. Due to the paucity of individuating information available online, there is little to prompt participants to deconstruct these stereotypes. Group identification is therefore stronger and the self is seen in relation to the group.

Deindividuation does not necessarily have equalizing effects as is commonly assumed but might instead lead to an accentuation of existing differences between social groups (Postmes & Spears, 1998; Spears & Lea, 1994). Hence deindividuation might in fact enhance inter-group differences rather than reduce it. When a common social identity of group membership is accessible, a deindividuated encounter in a group may divert attention away from the individual level of interaction and focus attention on the social level, thereby emphasizing the social boundaries of in-group and out-group. In other words, the lack of individuating cues in CMC can divert individuals' attention away from idiosyncratic characteristics of group members, deindividuating person perceptions and making people more susceptible to group influence (Postmes et al., 1998; Spears et al., 2001; Tanis & Postmes, 2003).

Deindividuation leads to an attribution of greater similarity and liking for the group (Postmes et al., 1998; Reicher et al., 1995).

What is important to note about the effects of anonymity and deindividuation is the relationship between the social context and the level of identity. According to SIDE, this positive group bias is nullified when users relate on the basis of individuating information and individual identities rather than group identities. If personal or individual identity is salient, the effects of isolation and anonymity will serve to further reduce the sense of being part of a group, thereby individuating the individual and removing the influence of the group and its social norms (Lea & Spears, 1991; Spears & Lea, 1992; Spears et al., 1990). When personal identity is salient, anonymity and the lack of visual cues will further weaken the salience of group identity and thus undermine both conformity to in-group norms, and the tendency to engage in inter-group behavior. In these circumstances, CMC may weaken the power of the group over the individual. However, if group identity is salient, the deindividuating conditions of isolation can strengthen the salience of group identification, so that people are more likely to conform to group norms and engage in inter-group behavior. A point to note is that group norms may be situationally and locally defined, and hence may be quite independent and distinct from social norms that exist at the levels of communities and societies (Postmes & Spears, 1998; Sherif, 1967).

Spears, Lea, & Lee (1990) manipulated identifiability (low vs. high) and group salience (individual vs. group) as the two key variables in an experiment in which they hypothesized that when participants are deindividuated, adherence to group norms will be high and therefore group polarization will be more likely to occur. They predicted that the attitudes of the participants in deindividuated conditions (i.e. low identifiability and group salience) would become the most polarized. The results

confirmed the hypothesis that deindividuation resulted in increased sensitivity to situational norms and responsiveness to cues from the environment that indicate what would be the appropriate and desirable behavior in that particular context (Postmes et al., 1998). Participants who were deindividuated complied more strongly with the situational norm. Thus on the whole, deindividuation appears to have increased the sensitivity to situational norms and the responsiveness to cues from the environment indicating what would be appropriate and desirable behavior in that particular context (Lea & Spears, 1992).

Postmes, Spears and Lea (2002) showed that deindividuated groups diverged or became bipolarized when compared to individuated groups. Participants also identified more strongly with their own group in deindividuated conditions and perceived the out-group as more homogeneous. Lee and Nass (2002) showed that even when interacting via the computer, people succumbed to group pressure when they believed that other people would see their responses. This normative influence observed arose from the participants' awareness that they were engaged in "social" interactions. Their results seem to validate the SIDE model, which postulates that normative concerns persistently dictate human behaviors in CMC, especially when group identity is made salient. The mere fact that other interactants would see the participant's response apparently led to different reactions than they would have exhibited otherwise.

Based on the SIDE model, choice shift and group polarization would therefore not be explained not via exchange of arguments or the pressure of social comparison but as an effect of normative influence. An individual's self-identification as a group member leads him or her to an adherence to the group's norms (Sassenberg & Boos, 2003). Group norms emerge through interaction as a function of within group accommodation to a prototype that is inferred from in-group communication (Postmes

et al., 2000). This norm is either learned in earlier interactions, or in the case of an interacting group, it is the group prototype that is inferred from individual attitudes. The prototype is the attitude that differs least from the in-group members' attitudes and most from the out-group members'. When the context does not allow comparison with an out-group, the range of possible attitudes (i.e. the scale positions which are not held by in-group members) replaces the out-group as a comparison standard (Turner, 1991). The way in which norms are formed is not just the result of a passive perceptual process, but one of active negotiation and contestation within the group, limited by the group's historical and ideological continuity (Reicher, Spears, & Postmes, 1995). Such processes are especially likely to occur in CMC groups where certain features of the group may reinforce the normative pull of the group (Postmes et al., 1998).

Deindividuation and group polarization

From the extant literature, it appears that greater choice shift and group polarization occur when people make decisions in groups, regardless of whether the discussion takes place online or in a FTF context. In fact, under conditions of deindividuation in the CMC context, greater choice shift and group polarization can occur, due to the strength of the group norm (Lee, 2006, 2007; Spears et al., 1990). Deindividuated subjects whose group identity was made salient exhibited the most norm-directed group polarization and those whose individual identity was made salient displayed the least. Lee (2007) further examined the psychological mechanism underlying group polarization and found that group identification largely correlated with group polarization. It was found that deindividuation increased conformity and amplified group influence not only by elevating normative concerns associated with group identification and in-group feelings but also by modifying an individual's

cognitive representation and understanding of the group norm. Participants in deindividuated groups were not only more inclined to conform towards the group norm, but they also thought that the group norm was more extreme as compared to participants in individuated groups (Lee, 2006).

Lee asserts that not only do participants attributed greater similarity to their CMC partners when they did not exchange brief personal profiles prior to the group discussion, and this perceived within-group homogeneity facilitated conformity to group norms, but deindividuation might also affect the internalization of group norms through differential message processing (Lee, 2008).

Insofar as people are motivated to make a correct decision, it seems like a reasonable assumption that people will think things through. However deindividuation might trigger a different social influence process. According to Kaplan (1989) informational influence is derived from a desire to make correct decisions, whereas normative influence is based on a desire to gain social acceptance or to maintain group harmony. He suggested also that normative influence occurs through little information-relevant thinking (peripheral processing) while informational influence involves the critical evaluations of the decision set (central processing).

Furthermore, increased attention to the task as measured by message recall did not correspond to increased endorsement of the group norm (Lee, 2006). Neither did more positive evaluation of arguments correspond to greater group polarization (Lee, 2007). Thus, it appears that when group polarization occurs, it is due mainly to the normative influence of the group, rather than persuasive arguments or informational influence. In summary, it appears that participants in deindividuated groups have greater perceived homogeneity to other group members, a stronger group identity, a stronger norm agreement, greater norm conformity and perceive the norm to be more

extreme than those in the individuated condition. As such, they would therefore make more extreme decisions (Lee, 2007).

This leads to my first research question that examines the role of normative influence and individuating information on group and individual decision-making. An examination of norm conformity and group polarization can serve to elucidate if any change in decision was due to informational influence or normative influence. Norm conformity refers to the difference between the individual's post-discussion decision and the group's decision, while group polarization refers to the difference between the individual's decision after the discussion and the individual's decision before the discussion.

In the individuated group, participants would be more likely to exhibit resistance to group norms when making their individual decisions and show less of a cognitive change. This implies that when individuated groups do exhibit group polarization and choice shift, they would be conforming to group norms because of conformity pressure and not because of an internal change in beliefs. However, the literature also seems to suggest that although there might be a shift in the group's decision, the individuals within a group might not all be in agreement with the decision.

In line with the deindividuation effects put forth by the SIDE model, it is hypothesized that participants in deindividuated groups would show greater agreement with the group's decision than the participants in individuated groups. By measuring the difference between the group's decision and the participant's post-discussion decision, it would be possible to see if norm conformity was due to a conversion of attitudes or compliance to the group. There should be no differences between individuated and deindividuated groups if conversion of attitudes were at work since both groups would have been exposed to the same materials with the only difference

being the salience of the group identity. However, if compliance to the group was at work, we should see that those participants in deindividuated groups conforming more to the norm while those in the individuated condition conforming less. This would be shown by a greater difference between the group decision and the participant's post-discussion decision for those participants in the individuated groups than in the deindividuated groups.

RQ1: What is the effect of normative influence on group and individual decision-making?

H1: Participants in individuated groups will show less norm conformity than those in deindividuated groups.

In a similar vein, if normative influence was in operation, participants in individuated groups should hold more strongly to their own decisions and even though they might shift their views to accommodate the group's decision, their opinions would not change much between the pre and post discussions. Hence there should be a greater difference between the pre-discussion decision and the post-discussion decision for those participants in the individuated groups than the deindividuated groups.

H2: Participants in individuated groups will show less group polarization than those in deindividuated groups.

As mentioned earlier in the literature, not only do individuals make more extreme decisions in deindividuated groups as compared to individuated groups, the

groups themselves make more extreme decisions (Lee, 2007). This can be measured by looking at the choice shift, which is the difference between the group decision and the pre-discussion decision. Individuated groups should be better able to resist group pressure and be less extreme in their decisions. Therefore, there should be a greater difference between the group decision and the pre-discussion decision for those participants in the individuated groups than the deindividuated groups

H3: Participants in individuated groups will show less choice shift than those in deindividuated groups.

The first three hypotheses share a common independent variable of individuating information. Individuating information was operationalized as the sharing of personal information such as hobbies, likes and dislikes, major and hometown. In H1, the dependent variable was norm conformity, while in H2 and H3, the dependent were group polarization and choice shift respectively.

Most of the studies conducted on group decision-making do not engage strong pressure for the group to conclude a discussion nor do they require the group to come to a unanimous conclusion. Lee's research (2006, 2007) for example, required the participants to discuss the topics but did not require them to come to a group consensus on the issue or to make a unanimous decision. It has frequently been found that groups have more difficulty in making unanimous decisions and they take longer to reach unanimous decisions than they do majority decisions (Foss, 1981; Miller, 1985; Nemeth, 1977). Kaplan and Miller (1987) found that the decision rule has a moderating effect on the type of influence employed in the decision making process, with the shift being the greatest in groups in which were required to reach a unanimous decision. One reason was that under a majority rule, extreme individuals

could be ignored as the others in the group had neither to influence them nor concede to them in order to reach a decision. However under unanimity rule, members tried to persuade each other not only on the basis of facts or informational influence but also with statements of appropriateness and expressions of preferences. Thus decisions under unanimity conditions as opposed to majority rule should give greater influence to extreme deviates in either direction.

Thus acquiescence to norms might be stronger in decision contexts requiring the reaching of a group consensus. This leads to the possibility that the mode of deliberation i.e. a discussion or a decision-making situation might influence the normative influence of the group and subsequently, on group polarization.

RQ2: What is the effect of consensus decision on decision-making?

H4: Participants in groups that are required to come to a consensus will show greater group polarization than those that do not.

For H4, the independent variable is deliberation and was operationalized as discussion leading to a group decision. The dependent variable was group polarization.

So far, studies in choice shift whether it be in the online or the face-to-face context have used scenarios with very rational decisions. Existing research looks at risk via an economic lens or via the rational perspective and most of the research so far has been in a business or economic setting. Risk issues have been known to work differently. Literature from risk communication has shown that people think about and react to risky issues differently than they would to economic or intellectual issues. Currently, there has yet to be any studies conducted which examines how people make decisions about risky issues online.

Risk Perception

People do not perceive the world in a vacuum and the way that we perceive risk is not a solitary individual activity. The individual is situated in society and this affects the way that he perceives situations and events. An important aspect, which influences the way that an individual perceives risk, is that of the group affiliations that the individual has. The individual's social affiliations might influence the way that an individual views a particular risk and might also serve to amplify the severity of the risk. Research on perception of risk has found that membership in social groups shape the selection of information that the individual regard as important. Interpretations that are inconsistent with existing beliefs are often ignored or attenuated and are intensified if the information is in accord with existing beliefs (Freudenburg, 1988; Slovic, 1987).

According to Kasperson (1992), adherence to group norms is one way by which risks are amplified. Group membership and role identification shapes the salience of various aspects of the information that one receives. Individuals or groups select specific characteristics of these events or aspects of the associated depictions and interpret them according to their perceptions and mental schemes. They also communicate these interpretations to other individuals and groups and receive interpretations in return. These groups in turn process the information and respond accordingly in light of their existing views, schemas, knowledge, beliefs and concerns (Kasperson, 1992; Kasperson et al., 1988).

Risk can be defined as being "in part the threat of direct harm that happens to people and their environments regardless of their social constructs, and in part the threat associated with the social conceptions and structures that shape the nature of other hands (to people, corporations, social institutions, communities, and values)"

(Kasperson, 1992). Risk perception research has shown that an individual's perception of risk is based on a variety of factors other than a technical probabilistic assessment of risk. Factors such as the level of knowledge or familiarity with the risk, the amount of dread associated with the risk, the voluntariness of undertaking the risk as well as the benefits accruable from undertaking the risk all play a part in an individual's risk perception and acceptance of a risk. In addition, the stigma associated with the risk as well as culture of the society of which the individual is part of, also has an influence on the way that the individual is oriented towards the risk (Slovic, 1987). Thus, in defining a risk there is the technical component of risk which hinges on the probability of events and the magnitude of consequences, as well as a social or perceptual analysis of the hazard (Freudenburg, 1988).

Slovic and his colleagues (1992) in their research on the perception of risk found that risk is also inherently subjective. It does not exist independent of our minds and cultures but humans have invented the concept of risk to help them understand and to cope with the dangers and uncertainties of life. Their psychometric paradigm assumed that risk is subjectively defined by individuals who may be influenced by a wide array of psychological, social, institutional, and cultural factors. They showed that the concept of risk meant different things to different people. When experts judged risk, their responses correlated to technical estimates of annual fatalities. When laypeople judged risk, their judgment was affected by other factors such as catastrophic potential, controllability, threat to future generations, and as a result differed considerably from their own and experts' estimates of annual fatalities.

Research has also shown that the layperson sees risk as consisting of many qualitative characteristics such as knowledge of risk, perceived risk and benefit, controllability, voluntariness, and dread. In fact, the feeling of dread was the major determinant of public perception and acceptance of risk for a wide variety of hazards,

and the layperson's risk perception and attitudes are closely related to the how they feel about the dread factor. The higher a hazard scored on the dread factor, the higher the perceived risk, the more people want to see its current risk reduced and the more they want to see strict regulations employed to achieve the desired reduction in risk. In contrast, experts' opinions of risk are not closely related to these characteristics but they see risk as synonymous with expected annual mortality (Slovic, Fischhoff, & Lichtenstein, 1979). Due to the fact that the underlying way that laypeople view risk is qualitatively different from the way that experts view risk, expert recitation of risk statistics will often do little to change people's attitudes and perceptions.

There are 2 fundamental ways in which humans understand risk. The "analytic system" utilizes algorithms and rules such as probability, logic, and technical risk assessments, while the "experiential system" is intuitive and mostly automatic, and often not accessible to human consciousness. This experiential system remains the most natural and common way to respond to risk and it relies on images and associations linked by experience to emotion and affect (Slovic, Finucane, Peters, & MacGregor, 2004). This was echoed in Epstein's (1994) view that there are two ways that people apprehend reality. One is via the intuitive, automatic, natural, non-verbal, narrative and experiential way and the other is via the analytic, deliberative, verbal and rational manner. Research has shown that affective and emotional processes interact with reason-based analysis in all normal thinking and indeed are essential to rationality (Damasio, 1994).

Affect.

The earliest studies of risk perception found that whereas risk and benefit tend to be positively correlated in the world, they are negatively correlated in people's minds and judgments (Fischhoff, Slovic, Lichtenstein, Read, & Combs, 1978). Risk

perception is not a deliberative cognitive process. It is colored by one's affective judgment. It is highly dependent on intuitive and experiential thinking and is guided by emotional and affective processes. Zajonc (1980) argued that affective reactions to stimuli are often the very first reactions, occurring automatically and subsequently guiding information processing, and judgment, and that all perceptions contain affect to some degree.

One of the characteristics of the experiential system is its reliance on affect. Affect is a subtle form of emotion, defined as positive (like) or negative (dislike) evaluative feelings toward an external stimulus. Such evaluations occur rapidly and automatically. Reliance on affect is a quicker, easier and more efficient way of making judgments and to navigate a complex, uncertain and sometimes dangerous world. Alhakami and Slovic (1994) found that people based their judgment of an activity or technology not only on what they think about it but also how they feel about it. If their feelings toward an activity are favorable, they are moved towards judging the risks as low and the benefits as high but if their feelings towards it are unfavorable, they tend to judge the opposite. Therefore, affect comes before judgment and directs judgments of risk and benefits. They termed this process the "affect heuristic", and they propose that if a general affective view guides perceptions of risk and benefit, providing information about benefit should change perception of risk and vice versa.

Building upon the Alhakami and Slovic (1994) study, Finucane, Alhakami, Slovic and Johnson (2000) purported that people used an affect heuristic in judging risk. People consult or refer to an 'affective pool' which contain all the positive and negative images associated with the object or activity being judged. An inverse relationship between risk and benefit evaluations occurs because they are derived from a common affective source. Their study supported the notion that risk and benefit

judgments are influenced in part at least by the overall affective evaluation and that people used affect to make judgments and that affect is an important evaluation mechanism in risk perception. They also found an inverse relationship between perceived risks and benefits when time pressure was introduced. The affect heuristic comes into play especially when the opportunity for analytic deliberation is reduced and an efficient mode of judgment is needed. This result was replicated in Ganzach's (2001) study of financial risk taking. These studies demonstrate that affect influences judgment directly and is not a mere response to a prior analytic evaluation.

Lowenstein, Weber, Hsee and Welch (2001) noted that when the situation is uncertain, people tend to have a none or all response that is sensitive to the possibility rather than the probability of strong positive or negative consequences. This explains why societal concerns about hazards such as nuclear power and exposure to small amounts of toxic chemicals fail to recede in response to information about the very small probabilities of the feared consequences from such hazards. Rottenstreich and Hsee (2001) showed that if the potential outcome is emotionally powerful, its attractiveness or unattractiveness is relatively insensitive to changes in probability even if the change was to be as great as from 0.99 to 0.01.

The content or the nature of the issue under consideration would also have an effect on the sort of influence likely to emerge in decision-making. Laughlin and his colleagues (Laughlin, 1980; Laughlin & Earley, 1982) have proposed that many issues on which groups make decision can be located along a continuum. At one end of the continuum are intellective issues for which there are or are considered to be demonstrably correct answers. At the other end of the continuum are moral issues, which involve behavioral, ethical or aesthetic judgments for which there are no demonstrably correct answers. For moral issues, the right answer is achieved by reaching consensus. This however does not imply that intellective issues involve no

moral component or appeal to consensus of preferences, for all knowledge rests on an implicit social consensus about the logical and epistemological bases of that knowledge (Laughlin, 1980; Laughlin & Earley, 1982). Nor does the distinction mean that moral issues do not have an intellective component. Rather it implies that for moral issues, the facts alone do not determine the choice of an alternative (McGrath, 1984). The preferred alternative depends not on the marshalling of facts and the discovery of truth but on the assertion of preference and the attainment of consensus.

Intellective issues appear to lead to heavier use of informational influence during group discussion, whereas moral issues appear to evoke the use of normative influence (Kaplan, 1989; Kaplan & Miller, 1987). The issue type also appears to be influenced by the imposed decision rule. The greater use of normative influence when the issue is moral and of informational influence when the issue is intellective tends to increase when the decision rule is that of unanimity rather than of majority consensus.

Extant research has yet to look into how people make decisions if the issue on hand is one with a risk element instead of being intellective or moral. Risk issues are contextually different from either intellective or moral issues and they often appeal to the visceral or affective components within us. As such, it would be interesting to note the effect of a risk issue on choice shifts and group polarization within an online group decision-making context. This leads me to my third and last research question, which looks at the content of the issue under discussion. It is hypothesized that when groups have to make a unanimous decision concerning a risk issue, there would be a greater choice shift than when making a decision on either intellective or moral issues. Therefore depending on the issue at hand, the cognitive process that goes into the decision making process would differ. Hence, a risk issue would serve to elicit more of an intuitive decision making framework and this would be prone to normative influence much more than if the issue was one that was more intellective or moral.

When the content of the issue is risky, the decision-making process would be subject to greater normative influence.

RQ3: What is the effect of the content of the issue on decision-making?

H5: Decisions regarding risky issues will show a greater choice shift than intellectual or moral issues.

H6: Decisions regarding risky issues will show a greater group polarization than intellectual or moral issues.

H7: Decisions regarding risky issues will show a greater norm conformity than intellectual or moral issues.

In the last three hypotheses, the independent variable was story content and was operationalized as the content of the issue under consideration. In this study, there were three different story types. They were intellectual stories that had a clear-cut right and wrong answer, moral stories that had a judgmental element to the stories and risk stories, which had an element of danger and were meant to provoke a visceral response. The dependent variables were choice shift for H5, group polarization for H6 and norm conformity for H7.

CHAPTER 3

METHODS

Research Design

A 2 (decision/discussion) x 2 (individuated/deindividuated CMC) factorial experiment was designed to examine how an environment with a heightened social identity affects the decision-making process, in particular with regards to the making of extreme decisions. The first factor was deliberation. This was divided into the decision condition in which the groups were asked to come to a consensus decision after the group discussion and the discussion condition in which the groups were only told to share their views and to discuss the issues. The second factor was individuating information. This was comprised of the individuated CMC condition in which personal information was shared and the deindividuated CMC condition, whereby the participants were told to start the discussion immediately and not to divulge any personal information. The research design is presented as a figure below.

	Individuating Information		
		Individuated	Deindividuated
Deliberation	Decision	13 x 3 = 39	13 x 3 = 39
	Discussion	12 x 3 = 36	13 x 3 = 39

Figure 1. Research Design

Participants.

Student participants (N = 153) were recruited from several classes in communication for a "group online decision making" experiment. They were offered either extra credit or a monetary incentive ($10) for their participation. The age of the participants ranged from 19 to 52 (M = 19.98, SD = 3.373), 35.9% of the participants were male and 64.1% of them were female. The sample consisted of 24.3% freshmen, 48.4% sophomores, 14.4% juniors, and 13.1% seniors. One person in a group from the individuated/decision condition did not complete the post-discussion questionnaire and that group was dropped from the analysis.

Procedure

When the participants arrived for the experiment, they were randomly assigned to one of the four experimental conditions. They were placed in separate rooms each equipped with a laptop computer. They were told that they would be taking part in a group decision-making exercise and would be interacting with 2 other participants. As the participants were shuttled to their respective rooms immediately upon arrival, there was no opportunity for them to meet or get to know each other prior to the start of the experiment.

At the start of the experiment, participants were presented with a questionnaire consisting of the 6 choice dilemmas and asked to give their individual judgments on these dilemmas. After the participants had made their decisions, they were requested to take part in a group discussion about the dilemmas via CMC. Those in the decision condition were asked to come to a consensus in which everyone in the group had to agree with the decision. In the discussion condition, participants were asked to share their opinions on each dilemma, but not to arrive at group consensus.

The participants communicated with each other via the synchronous Windows Live Messenger System, which is a popular online instant messaging system. This is a freeware instant messaging system developed and distributed by Microsoft. It allows synchronous communication whereby users can communicate online in real time. Seeing as to how most college students utilize one form or another of these instant messaging systems, such as Yahoo! Messenger or AOL Instant Messaging, there was no problem with the participants being acquainted with this chat system.

A conversation window for the discussion was opened on the computers and participants typed their responses into an input box at the bottom of the conversation window. The messages scrolled upwards as the participants typed in their responses. In the conversation window, participants could when the other participants were typing their responses. A transcript of the conversation was automatically captured and stored on the computers.

Participants were told that they had about an hour to talk about the issues. At then end of the time frame, those in the decision condition were told to come to a decision and those in the discussion condition were told to wrap up their discussion. Most groups took between 45 to 75 minutes for their conversations. They were all then requested to complete the questionnaire regarding the choice dilemmas once again on their own. This time they were told that often having been in a group discussion might affect people's decisions and that they might not have agreed with the decisions of the group or other group members. They were also given a questionnaire, which contained questions pertaining to demographics as well group identity and group satisfaction. Finally, they were then debriefed and thanked.

Manipulation of Identity

Group and individual identity was manipulated by the giving of different instructions directly before the discussion. In the individuated condition, the participants were told that they would be discussing the dilemmas with students majoring in other subjects. They were told to share personal information such as college, major, hometown, hobbies, the sports they played and the music or movies that they enjoyed. They were told to discuss these issues for about 5 minutes before the start of the group discussion. The instructions also highlighted the advantages of having people with different opinions and backgrounds in a discussion. For those in the deindividuated condition, the participants were told that they were all students in the same major and the advantages of group work and group cohesion was highlighted. Those in the individuated condition were also asked to jot down the characteristics of the other group members as individuals, while those in the deindividuated condition were asked to write down the characteristics of their group. The participants were also consistently referred to as either group members or individual participants throughout the course of the experiment. These instructions were similar to those used by Walther (1997). (For details of manipulation, please see Appendix 2 and 3).

To maintain anonymity, personal names were not used. Those in the individuated condition were given the screen names of Individual 1, 2 or 3 while those in the deindividuated condition were referred to as Group Member 1, 2 or 3. In addition, those in the individuated condition had different pictures/icons attached to their screen names, while for those in the deindividuated condition had identical pictures of either a horse, a chess board, a dog or a beach scene attached to their screen names. The choice of the pictures was random. The following are two examples of

what a chat session looks like. The first is taken from a transcript from an individuated group, while the second is a transcript from a deindividuated group.

Individual 1 says (12:02 PM): hey
Individual 2 says (12:02 PM): hi
Individual 3 says (12:02 PM): hiii
Individual 1 says (12:02 PM): sorry for taking so long... I had to eat lunch
Individual 3 says (12:02 PM): nice of you to join us
Individual 2 says (12:02 PM): haha, its okay
Individual 3 says (12:03 PM): where are you from #1
Individual 1 says (12:03 PM): um, Malone, NY... about 5 minutes from the Canadian border
Individual 1 says (12:03 PM): you?
Individual 3 says (12:04 PM): monroe, new york- 40 minutes outside the city
Individual 2 says (12:04 PM): i feel so left out... not from ny but nc

Figure 2. Transcript of the beginning of a session for an individuated group.

Group Member 1 says: (4:56:23 PM): hey
Group Member 2 says: (4:56:26 PM): hi
Group Member 3 says: (4:56:30 PM): hello
Group Member 2 says: (4:56:49 PM): i feel the male in the situation should be confronted
Group Member 3 says: (4:56:55 PM): i do too
Group Member 1 says: (4:57:00 PM): yes i put 100%
Group Member 2 says: (4:57:09 PM): and whether or not i confront the female would be dependent on his response
Group Member 3 says: (4:57:14 PM): oh i put 90
Group Member 3 says: (4:57:22 PM): but we can do 100
Group Member 1 says: (4:57:38 PM): i would just want to see what he has to say and get his side of the story
Group Member 3 says: (4:57:55 PM): yea i wouldnt tell the female
Group Member 1 says: (4:58:01 PM): i
Group Member 2 says: (4:58:03 PM): why not?

Figure 3. Transcript of the beginning of a session for a deindividuated group.

The Choice Dilemmas

There were six choice dilemma scenarios that the participants were asked to give their responses to. There were two intellect-based, two moral-based and two risk-based scenarios. In contrast to the original Choice Dilemma Questionnaire (Wallach et al., 1962), the scenarios presented in this study, although still hypothetical were revised so as to make them more personally relevant to the college-aged participants. The moral-based scenarios were adapted from two of the four scenarios used in previous research by Burgoon & Hale (1988) and which have been shown to be capable of generating multiple perspectives in response to moral dilemmas. They were chosen because they comprised of questions that encompassed a moral/judgmental element but did not bring with them the element of risk. The intellect-based scenarios were adapted from Tversky and Kahneman (1981). They comprised of questions which had a right and wrong albeit not clear-cut answer.

The risk-based scenarios were specially devised for this study. Prior to the start of this study, several possible scenarios were created that bore an element of risk. These scenarios were then presented to a sample of undergraduates who were asked to rank them according to which they felt were the most realistic and applicable to them. These undergraduates were separately recruited and were different from those who participated in the study. Recruitment was via the snowball technique and the sample of consisted of 20 undergraduates from across the various colleges in the university. The top two scenarios were included in the study. Finally, the order of the presentation of the dilemmas was randomized (Please see Appendix 1 for the dilemmas used).

Variables/Measures

The variables in this study are presented in the following table:

Table 1.

Variables in Study

Independent Variables	Dependent Variables
Individuating information	Norm conformity
Deliberation	Choice shift
Gender	Group polarization
Story content	

Norm conformity was operationalized as the difference between the individual's decisions after the discussion and the group decision made. This was measured by taking the difference between the responses given to individual questionnaire answered after the discussion with the group decision as recorded in the questionnaire answered during the discussion.

Choice shift was operationalized as the difference between the individual's pre-discussion decision and the group's decision. This was measured by taking the difference between the responses given to individual questionnaire answered before the discussion with the group decision as recorded in the questionnaire answered during the discussion.

Group polarization was operationalized as the difference between the individual's pre and post discussion decision. This was measured by taking the

difference between the responses given to individual questionnaire answered before the discussion with the responses given to the individual questionnaire answered after the discussion.

Several studies have shown that gender has an effect on opinion change and decision-making. For example, Adrianson (2001) looked at opinion change in asynchronous CMC (emails) and FTF groups and found that females changed their opinions more than males did overall but especially in the CMC anonymous condition, while there was a higher opinion change in males in the FTF condition than in the other conditions. Diberardinis, Ramage and Levitt (1984) in their study of gender and risky shift found that females shifted the least in each treatment group and males shifted the most. In addition, several studies have found that demographic variables such as age and gender are associated with the willingness to speak out on controversial issues (Lasorsa,1991; Salmon & Neuwirth, 1990; Scheufele et al., 2001). Therefore, gender was used as a control variable in this study.

In addition, the participants were also asked about their levels of group identity and group satisfaction. Group identity was measured by items from Spears, Lea and Lee (1990) group identity scale, Tyler's (1999) shared identity scale and McCrosky and McCain (1974) social attraction scale. Group cohesiveness was measured by items from Seashore's (1974) group cohesiveness scale and group satisfaction was measured by items from Gouran's (1973) satisfaction scale. (For details of measures, please see Appendix 4). The group norm was not prescribed and as such the group decision was taken as the group norm.

CHAPTER 4

FINDINGS

Manipulation Check for Identity

The present study employed a manipulation for identity in which either the group or the individual identity of the participants was highlighted. Hence the participants were either in a condition in which their group had either a deindividuated or an individuated identity. A manipulation check in which the participants were asked to complete several questions that assessed how much they identified with, as well as how much they felt that they belonged with their groups was conducted to ascertain that the manipulation was successful. The questions were adapted from the scales used by Spears, Lea and Lee's (1990) group identity scale as well as items from Tyler's (1999) shared identity scale and McCrosky and McCain (1974) social attraction scale.

An index for identification was created consisting of 6 items taken from these scales. A factor analysis (varimax rotation with eigenvalue greater than 1) was conducted on an initial 12 items to ensure that all items were actually measuring the same concept and was part of a single construct. However, results revealed that the 12 items loaded onto 2 factors explaining 57.35% of the total variance. The first factor had items corresponding to the concept of loyalty to the group while the other factor had items corresponding to group identification and similarity with other members of the group. As the manipulation test was for group identity, the decision was made to use the 6 items corresponding to the concept of group identification and similarity with other members of the group to form the index of identification.

The scale consisting of these 6 items was found to be reliable (Cronbach's α = .7, n = 152). An ANOVA was run to compare the means between the 2 conditions and it was found that the level of identification with the group was significantly higher F (1, 151) = 12.71, $p < .001$ for groups in the deindividuated condition (M = 3.37, SD = .45, n = 152) as compared to those in the individuated condition (M = 3.08, SD = .53, n = 152).

Hypothesis Testing

The design of this study has a hierarchical structure in which individuals were nested within groups, thus leading to a problem of non-independence of observations as nesting has the tendency to produce within-group homogeneity. Therefore ordinary least square (OLS) regression was not a suitable method of analysis as the non-independence of observation violates one of the basic assumptions of OLS regression. The hierarchical or multilevel linear model (MLM) was used instead.

The MLM is a type of regression model that is particularly suitable for multilevel data. It differs from the usual regression models in that the equation defining the mixed model contains more than one error term, i.e. there is one (or more) error term for each level of the model (Snijders & Bosker, 1999). In addition, MLMs also provide the flexibility of modeling the variances and covariances of the means of the data (Browne & Rasbash, 2000; Hox, 1995; Singer, 1988).

A common critique of OLS regression is that it places too much attention on the individual and does not take into account the context that the individuals are located in, such as the social and institutional contexts (Bickel, 2007). For example, the teachers, facilities and even the socioeconomic environment of the school could have an effect on the education attainment of the children in the school. Fitting a

model that does not recognize the existence of clustering creates serious technical problems such as the underestimation of standard errors of regression coefficients, which might obscure the fact that what appears to be a significant difference can be actually ascribed to chance, in other words, it increases the chances of committing a Type 1 error. Correct standard errors would only be estimated if variations at both the individual and the cluster levels were allowed for in the analysis.

In order to determine if nesting is consequential, the unconditional intraclass correlation is computed by dividing the variance between groups by the total variance. If the coefficient is statistically significant, this implies that a significant portion of the total variance can be explained by cluster membership and thus a multilevel model would provide substantial benefits over a standard fixed effects model. Any effects found for the nesting variable would imply that there is an effect due to the individual being in a particular group and hence there might be greater similarities for answers given by those being in that particular group. These effects need therefore be accounted for in the model as this effect is due to group that the individuals belong to and not to the condition that the group is in.

MLM addresses these problems by simultaneously modeling processes at all levels of the population hierarchy. It allows the slopes and intercepts of the variables of interest to vary from group to group and allows for the modeling of variance structure and estimates effects of predictors at the group level at the same time taking in account the unobserved group level variability. By focusing attention on all levels of the hierarchy in the population, multilevel modeling enables one to understand where and how effects are occurring. Thus it accounts for variability at each level of data and provides estimations of both the fixed as well as the random factors for individuals nested within groups (Kenny, Kashy, & Bolger, 1998).

To test the various hypotheses, the main effect and all the possible interactions among the relevant variables were included in the first run of the model. Non-significant terms were removed and the process repeated until only the significant effects remained.

Effect of Normative Influence on Decision-Making

Research Question 1: What is the effect of normative influence on decision-making?

Research question 1 examines whether normative influence drives opinion change in online groups. It also looks at how individuating information affects decision-making, in particular its effects on the individual's decision in relation to the group's decision.

Hypothesis 1: Participants in individuated groups will show less norm conformity than those in deindividuated groups.

Hypothesis 1 predicted that participants in individuated groups would conform less to the group decision than those in deindividuated groups. This implies that the deindividuated participants show greater agreement with the group's decision than the individuated participants, which translates into a greater difference between the individual post-discussion decision and the group decision for the individuated participants.

The first analysis was a saturated omnibus test, which included the main effects and all the possible interactions between the variables of interest. Individuating information and gender were entered as fixed effects while group was entered as the random effect. Prior attitude, which was measured by the answers given in the pre-discussion questionnaire, was entered as a covariate control variable. Norm

conformity was the dependent variable, which was measured by taking the difference between the answers given in the group decision and the answers given by the participants individually after the group discussion.

As the interaction between gender and identity was insignificant F (1, 59.468) = 1.961, p = .167, the interaction term was dropped and the analysis was run for the main effects of the variables on norm conformity. The data showed that neither gender was significant F (1, 63.518) = 1.425, p = .237 nor identity was significant F (1, 19.058) = .631, p = .437.

Table 2.

Effect of Individuating Information on Norm Conformity

Independent Variables	Num df	Denom df	F	p
Gender	1	63.518	1.425	.237
Individuating Information	1	19.058	.631	.437
Prior Attitude	1	64.035	6.887	.011

The difference between the individual post-discussion decision and the group decision of the participants in the individuated groups was (M = -.03, SE = 1.144, n = 21.965) while that of the deindividuated groups was (M = -1.238, SE = 1.087 n = 20.92). However, the overall MLM showed that individuating information was not significant and so H1 was not supported.

Table 3.

Details of the Effects of Individuating Information on Norm Conformity

Individuating Information	M	SE	F	p
Individuated	-.03	1.144	.631	.437
Deindividuated	-1.238	1.087		

The variance within groups was 38.671 (SE = 8.245) while the variance between groups was 1.299 (SE = 5.679), resulting in an intraclass correlation of 1.299/(1.299 + 38.671) = .032. This implies that there is a slight clustering effect and about 3.2% of the variance can be explained by group membership.

Hypothesis 2: Participants in individuated groups will show less group polarization than those in deindividuated groups.

Hypothesis 2 predicted that participants in individuated groups would show less group polarization than those in deindividuated groups. Group polarization was measured by the difference between the individual's decision before the discussion and the individual's decision after the discussion. The MLM was run with identity and gender as fixed effects and with group as the random effect.

The data failed to show any significance for the interaction F (1, 133.364) = 2.976, p = .087. After removing the interaction, the main effects of individuating information F (1, 48.09) = .643, p = .427 or gender F (1, 134.268) = .001, p = .982 still failed to show any significance, hence H2 was not supported.

Table 4.

Effect of Individuating Information on Group Polarization

Independent Variables	Num df	Denom df	F	p
Gender	1	134.268	.001	.982
Individuating Information	1	48.090	.643	.427

The difference between the individual post-discussion decision and their initial pre-discussion decision for the participants in the individuated groups was (M = 1.563, SE = 1.221, n = 52.370) while that of those in the deindividuated groups was (M = .241, SE = 1.151 n = 49.197).

Table 5.

Details of the Effects of Individuating Information on Group Polarization

Individuating Information	M	SE	F	p
Individuated	1.563	1.221	.643	.427
Deindividuated	.241	1.151		

The variance within groups was 73.901 (SE = 10.596) while the variance between groups was 8.730 (SE = 7.764), resulting in an intraclass correlation of 8.730/82.631 = .11. This implies that there is a slight clustering effect as about 11% of the variance can be explained by group membership.

Hypothesis 3: Participants in individuated groups will show less choice shift than those in deindividuated groups.

Hypothesis 3 predicted that participants in individuated groups would show less choice shift than those in deindividuated groups. Choice shift was measured by taking the difference between the group's decision after discussion and the individual's decision before the discussion. MLM was run with the variables individuating information and gender as fixed effects and group as the random effect. The data failed to show any significance for the interaction F (1, 61.637) = .463, p = .499. After removing the interaction, the main effects of identity F (1, 21.33) = .434, p = .517 or gender F (1, 63.384) = .142, p = .708 still failed to show any significance. H3 was not supported.

Table 6.

Effect of Individuating Information on Choice Shift

Independent Variables	Num df	Denom df	F	p
Gender	1	63.384	.142	.708
Individuating Information	1	21.330	.434	.517

The difference between the initial pre-discussion decision and the group decision for the participants in the individuated groups was (M = 1.486, SE = 1.866, n = 24.306) while those in the deindividuated groups was (M = -.155, SE = 1.777 n = 23.286).

Table 7.

Details of the Effects of Individuating Information on Choice Shift

Individuating Information	M	SE	F	p
Individuated	1.486	1.866	.434	.517
Deindividuated	-.155	1.777		

The variance within groups was 94.608 (SE = 19.596) while the variance between groups was 6.589 (SE = 13.81), resulting in an intraclass correlation of 6.589/(6.589 + 94.608) = .065. This implies that there is a slight clustering effect, about 6.5% of the variance can be explained by group membership.

Effect of Consensus

Research Question 2: What is the effect of consensus on decision-making?

The second research question looked at how the need to come to a unanimous decision affected group and individual decision-making.

Hypothesis 4: Participants in groups that are required to come to a consensus will show greater group polarization than those that do not.

Hypothesis 4 predicted that participants in groups that are required to come to a consensus would show greater group polarization than those that do not. Again, group polarization was measured by the difference between the individual's decision before the discussion and the individual's decision after the discussion. MLM was run with deliberation and gender as fixed effects and with group as the random effect. The interaction failed to reach significance F (1, 133.265) = 2.546, p = .461 and was

removed. The analysis was re-run with only the main effects and neither deliberation F (1, 47.896) = .747, p = .392 or gender F (1, 134.437) = .011, p = .918 managed to reached significance. Therefore, H4 was not supported.

Table 8.

Effect of Deliberation on Group Polarization

Independent Variables	Num df	Denom df	F	p
Gender	1	134.437	.011	.6818
Deliberation	1	47.89	.747	.392

The variance within groups was 73.959 (SE = 10.611) while the variance between groups was 8.586 (SE = 7.758), resulting in an intraclass correlation of 8.586/82.545 = .104. This implies that there is a slight clustering effect as about 10.4% of the variance can be explained by group membership.

Table 9.

Details of the Effects of Deliberation on Group Polarization

Deliberation	M	SE	F	p
Decision	1.557	1.171	.747	.392
Discussion	.136	1.196		

Pairwise comparisons showed that the group polarization for the participants who had to come to a consensus was (M = 1.557, SE = 1.171, n = 49.08) while those

who did not was (M = .136, SE = 1.196, n = 52.156). The analysis however showed that this difference was not significant.

Effect of Content/Issue Type

Research Question 3: What is the effect of content on decision-making?

The last research question looked into the effect of the content of the issue on choice shift, group polarization and decision-making.

Hypothesis 5: Decisions regarding risky issues would show a greater choice shift than intellectual or moral issues.

Hypothesis 5 predicted that decisions regarding risky issues would show a greater choice shift than intellectual or moral issues. In this study, the two risk issues used were that of bird flu and drunk driving, while the two intellectual issues were those scenarios depicting the disease problem and game of chance. The two moral issues were those of infidelity and pregnancy/abortion. MLM was run with choice shift as the dependent variable gender and story content and their interaction as the independent variables.

The analysis showed that the interaction between story content and gender was significant, F (2, 795.005) = 3.770, p = .023. There was also a significant main effect of story content, F (2, 795.005) = 5.989, p = .003.

Table 10.

Effect of Content on Choice Shift

Independent Variables	Num df	Denom df	F	p
Story Content	2	795.005	5.989	.003
Gender	1	65.751	.012	.914
Story Content*Gender	2	795.005	3.770	.023

Risk issues had a greater choice shift (*M* .676, *SE* = .389), than intellectual (*M* = -.615, *SE* = .237) or moral issues (*M* = .355, *SE* = .322). However the mean difference was only significant between risk and intellectual issues (p = .003) and between moral and intellectual issues (p = .01). There were no other main effects.

Decomposition of the interaction effects showed that there was a significant difference *F* (1, 755.125) = 5.449, p = .02, between males and females when it came to intellectual issues with males (*M* = 1.131 *SE* = .375) making greater choice shifts than females (*M* = -.099, *SE* = .265). In addition, for males, *F* (2, 795.005) = 6.648, p = .001 the mean difference was significant between the choice shifts for risk and intellectual issues (p = .009) as well as the choice shifts for moral and intellectual issues (p = .002). There was a greater shift for intellectual issues (*M* = -1.131, *SE* = .375) than for risk issues (*M* = .758, *SE* = .631). There was also a greater shift for intellectual issues than for moral issues (*M* = .848, *SE* = .519).

Table 11.

Details of the Interaction Between Gender, Content and Choice Shift

Story Content	M	SE	F	p
Males				
Risk	.758	.631		
Intellectual	-1.131	.375	3.770	.023
Moral	.848	.519		
Females				
Risk	.594	.438		
Intellectual	-.099	.179	3.770	.023
Moral	-.138	.362		

The variance within groups was 18.605 (SE = .933) while the variance between groups was .215 (SE = .228) and resulting in an intraclass correlation of .006 for variance between groups. This implies that there is a slight clustering effect as about 0.06% of the variance can be explained by group membership. The data therefore partially supports H5.

Hypothesis 6: Decisions regarding risky issues would show a greater group polarization than intellectual or judgmental issues.

The sixth hypothesis states that risky issues would show a greater group polarization than intellectual or moral issues. Again a MLM was run, with group polarization as the dependent variable and gender and story content as the independent variables. Results for this set of analysis showed that there was no interaction effect

gender F (2, 1494.985) = 1.455, p = .234, but there was a significant main effect for story content, F (2, 1497.125) = 7.062, p = .001. There was no effect for gender F (1, 133.654) = .771 p = .382.

Table 12.

Effect of Content on Group Polarization

Independent Variables	Num df	Denom df	F	p
Story Content	2	1497.125	7.062	.001
Gender	1	133.654	.771	.382
Story Content*Gender	2	1494.985	1.455	.234

The variance within groups was 10.285 (SE = .376) while the variance between groups was .162 (SE = .112) and the variance between members of the group was .083 (SE = .149), resulting in an intraclass correlation of .06 for variance between groups and an intraclass correlation of .08 for variance between members of the group. This implies that there is a slight clustering effect as about 9.1% of the variance can be explained by group mmbership.

There was a greater group polarization for risk issues (M = .485, SE = .197), than for intellectual (M = -.264, SE = .126) and or moral issues (M = .166, SE = .165). Pairwise comparisons showed that there was a significant difference between the mean differences of risk and intellectual issues (p = .000), as well as a significant difference between moral and intellectual issues (p = .020) but there was the difference between risk and moral issues was not significant (p = .183). Thus H6 was partially supported.

Table 13.

Details of the Effects of Story Content on Group Polarization

Story Content	M	SE	F	p
Risk	.485	.197		
Intellectual	-.264	.126	7.062	.001
Moral	.166	.165		

Hypothesis 7: Decisions regarding risky issues will show greater norm conformity.

Hypothesis 7 predicted that decisions regarding risky issues would show a greater difference between the individual post-discussion decision and the group decision. MLM was run using gender and story type as the independent variables, prior attitude as the control covariate and norm conformity as the dependent variable.

Results from the MLM showed that the interaction between story content and gender was not significant, F (2, 80.154) = 1.619, p = .199. There was also no significant main effect of gender, F (1, 379.873) = 1.556, p = .213 or story content, F (2, 782.158) = 2.013, p = .134. As there were no significant main or interaction effects, H7 was not supported.

Table 14.

Effect of Story Content on Norm Conformity

Independent Variables	Num df	Denom df	F	p
Story Content	2	782.158	2.013	.134
Gender	1	379.873	1.336	.213
Prior Attitude	1	96.355	6.640	.011
Story Content*Gender	2	746	3.501	.199

The variance within groups was 3.537 (SE = .179) while the variance between members of the group was .008 (SE = .037), resulting in an intraclass correlation of .002. This implies that there is a slight clustering effect as about 0.2% of the variance can be explained by group membership.

The norm conformity for risk issues was (*M* = -.331, *SE* = .158), while that for intellectual issues was (*M* = .027, *SE* = .095) and the norm conformity for moral issues was (*M* = -0.56, *SE* = .130). However, pairwise comparisons showed that there was only a significant difference between the mean differences of risk and intellectual issues (p = .045).

Table 15.

Details of the Effects of Story Content on Norm Conformity

Story Content	M	SE	F	p
Risk	-.331	.158		
Intellectual	.027	.095	2.013	.134
Moral	-.056	.130		

CHAPTER 5

FURTHER ANALYSIS

As most of the analyses were not supported, further analyses were conducted to examine the data in greater detail. There were 2 main areas that warranted further investigation: (a) Individual scenarios and (b) outliers.

Individual Scenarios

One reason that several of the hypotheses were not supported, might be due to the nature of the dependent variables. Norm conformity, group polarization and choice shift were all composite variables in that each variable encompass the answers given for all the different issues. E.g.: in hypothesis 1 which looked at the effect of individuating information on norm conformity. Norm conformity was the difference between the individual's decision after group discussion and the group's decision across all the different issues. As seen in research question 3, the content of the issue being considered—whether it be risk, moral or intellectual in nature—has an effect on these variables. In order to tease out the effects that each individual scenario might have on the variables, MLM was run on each of these scenarios on its own.

To recap, the following table is a summary of the issues and the scenarios used for each issue. Some of the issues, such as Infidelity, Disease Problem and Game of Chance had more than one scenario.

Table 16.

Summary of Issues and Scenarios Used

Story Content	Issue	Scenario
Intellectual	Disease Problem: Imagine that the United States is preparing for the outbreak of an unusual disease, which is expected to kill 600 people. Four alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows: If Program A is adopted, 200 people will be saved but the rest will die. If Program B is adopted, there is a one-third probability that 600 people will be saved and a two-thirds probability that no people will be saved. If Program C is adopted, 400 people will die. If Program D is adopted, there is a one-third probability that nobody will die and a two-thirds probability that 600 people will die.	Disease Problem A: What is the lowest probability acceptable to choose Program A Disease Problem B: What is the lowest probability acceptable to choose Program B Disease Problem C: What is the lowest probability acceptable to choose Program C Disease Problem D: What is the lowest probability acceptable to choose Program D

Table 16 (Continued)

	Game of Chance Decision 1: Choose between the following: A) A sure gain of $240 B) 25% chance to gain $1000 and 75% chance to gain nothing Decision 2: Choose between the following: C) A sure loss of $750 D) 75% chance to lose $1000 and 25% chance to lose nothing	Game of Chance A: What is the lowest probability acceptable to choose option A over option B Game of Chance B: What is the lowest probability acceptable C over option D
Moral	Infidelity: Two good friends of yours are getting married in a few weeks. They are a young couple and have been dating for three years. One evening, while you are out dining, you notice the male across the room. He is displaying very affectionate, unmistakable intimate behavior with another female. What would you do?	Infidelity A: The probability of me confronting the male is … Infidelity B: The probability of me telling my female friend is …

Table 16 (Continued)

	Pregnancy: Your sister has approached you with a serious predicament. She is pregnant. She has been dating a young man for five months. Since they are young, age 19, they have no plans on getting married. She has not mentioned this to anyone. Your parents are strict Catholics, and yet, she is considering an abortion.	The probability of me trying to talk her out of the abortion is …
Risk	Bird Flu: Bird flu has been confirmed in several parts of New York State but the CDC has yet to issue an alert. It is in the middle of the semester and so classes and exams are still in session. Failure to attend classes and the exams will result in a much lower GPA. However, you also know that bird flu is a highly contagious disease, which is often fatal when contracted.	Please indicate the lowest probability that you would consider acceptable to make it worthwhile for you to go to classes and to take the exams.

Table 16 (Continued)

Risk	Drunk Driving: It is in the middle of winter and you are at a party and all your friends have already left. It is 3am and you are really tired and all you want to do is to get home as fast as possible. You need to sleep as you have to get up early for a very important appointment. However, the party is located very far from all forms of public transportation and although you could walk home, it would take you more than an hour to walk home. An acquaintance that you have just met at the party offers you a ride home. It is also clear that he has had way too much to drink and is in no condition to drive. Furthermore, the roads are very icy.	Please state the lowest probability that you would consider acceptable to make it worthwhile for you to take up the offer of a ride.

This study examined the effect of risk, moral as well as intellectual content on decision-making and in each of these content areas, 2 issues were used. For the intellectual content area, the issues used were of the disease problem and the game of chance. For the moral content area, the issues used were that of infidelity and pregnancy. Lastly, for the risk content area, the issues looked into were that of bird flu and drunk driving.

The next step in the analysis was to test each issue and scenario separately to see if the variables—norm conformity, group polarization and choice shift—for each of these issues and scenarios differed. There were a total of 11 scenarios. For each

scenario, MLM was used. The first analysis used norm conformity as the dependent variable with gender, identity and prior attitude as the fixed effect variables. A second set of analysis was then run using group polarization as the dependent variable. The analysis was run once more using choice shift as the dependent variable. A summary of the significant effects is shown in the following table:

Table 17.

Summary of Significant Effects

Issue	Independent Variable	Dependent Variable	Effect
Drunk Driving	Identity Gender	Norm Conformity	Interaction Effect
Infidelity A	Identity Gender	Group Polarization	Interaction Effect
Infidelity B	Gender	Choice Shift	Main Effect
Infidelity B	Gender	Group Polarization	Main Effect
Game of Chance A	Gender	Norm Conformity	Main Effect
Game of Chance B	Gender	Norm Conformity	Main Effect
Game of Chance B	Identity	Group Polarization	Main Effect

Outliers

Another reason for the lack of support for the hypothesis was that the majority of the participants did not change their answers. Upon examination of the frequency of the distribution of the variables norm conformity, group polarization and choice shift, it was found that the mode was often zero. This might have been because of the homogeneity of the group, being as they were all college students, their answers to these issues were similar to each other, hence the lack of change. However, the variance of these variables were quite often large, implying the existence of outliers or certain students who held more extreme views and who might have been more resistant to change and group influence. The lack of significant results might have been due to the neutralization of the effect of these outliers by the majority that did not change. Having the bulk of the participants centered on a mode of zero as well as the presence of outliers at both ends of the spectrum might have had the effect of canceling out and over-riding possible effects at the tail-end. These outliers are of interest as it is important to know how individuating information and deliberation affect this group of people.

To test the effects of individuating information and deliberation on these outliers, the frequency of the responses for each variable was first calculated. Those participants whose responses fell into the tail-ends (approximately 7.5% from each end) were selected from the initial dataset and were used as cases to be analyzed. A mixed model analysis was then performed on this second dataset. A summary of the significant effects for the outliers is shown in the following table:

Table 18.

Summary of Significant Effects for Outliers

Issue	Independent Variable	Dependent Variable	Effect
Infidelity A	Gender Identity	Group Polarization	Interaction Effect
Infidelity B	Gender	Group Polarization	Main Effect
Infidelity B	Gender	Choice Shift	Main Effect
Game of Chance A	Gender	Norm Conformity	Main Effect
Game of Chance A	Gender	Choice Shift	Main Effect
Game of Chance B	Identity	Norm Conformity	Main Effect
Game of Chance B	Identity	Group Polarization	Main Effect

Note. Game of Chance A showed a gender effect for choice shift when the analysis was run with the outliers. No such effect was shown when the analysis was run with the entire data set.

The following section lays out a detailed analysis of the findings reported above. The significant overall findings for each scenario are reported first, followed by those pertaining to the outliers.

Drunk Driving

Norm conformity – significant interaction effect.

There was a significant interaction effect between gender and individuation information F (1, 63.302) = 4.444, p = .039.

Table 19.

Effect of Individuating Information (II) on Norm Conformity (Drunk Driving)

Independent Variables	Num df	Denom df	F	p
Gender	1	62.619	2.668	.107
Individuating Information	1	26.821	.623	.437
Prior Attitude	1	69.395	.722	.398
Gender* Individuating Information	1	63.302	4.444	.039

The variance within groups was 4.029 (SE = .842) while the variance between members of the group was .115 (SE = .547), resulting in an intraclass correlation of .028.

Further analysis of the interaction effect indicated that there was a significant difference F (1, 62.732) = 7.946, p = .006 between males and females in the deindividuated condition with males (M = -1.678, SE = .548, df = 61.514) showing a greater amount of change than females (M = .225, SE = .414, df = 39.101). Males in the deindividuated condition therefore showed less norm conformity than females in the deindividuated condition. Compared to the group decision, deindividuated males adopted a riskier position while deindividuated females adopted a more cautious position. No other comparisons were significant.

Table 20.

Details of the Effects of Gender and Individuating Information (II) on Norm Conformity (Drunk Driving)

Individuating Information	M	SE	F	p
Males				
Individuated	-.191	.655	4.444	.039
Deindividuated	-1.678	.548		
Females				
Individuated	-.431	.406	4.444	.039
Deindividuated	.225	.414		

As the question asked for the lowest probability of NOT getting into an accident that was acceptable for a ride to be considered, the lower the number given, the riskier the participant's choice would be, i.e. 0 = risky, 10 = cautious. A negative number for norm conformity would indicate that the participant chose a riskier option than the group decision while a positive number for norm conformity would indicate that the participant chose a more cautious option as compared to the group decision.

A cross tabulation between the gender and norm conformity indicated that the most extreme responses were given by males and that it was males that made riskier decisions than females as well as riskier decisions than the group decision. Six participants made riskier decisions than the group decision and five out of the six participants were male. The groups gave decisions of either nine or 10 on a scale of 10. For one participant (norm conformity = -10), the group gave a decision of 10

while the participant gave a decision of 0 after the group discussion while for another participant (norm conformity = -9), the group gave a nine while the participant gave a 0. In most of the cases (norm conformity = +/- 1) the participants differed slightly from the group's decision but their final responses were the same as their initial responses prior to the group discussion. One participant (norm conformity = -3), gave a riskier response (6/10) than the group decision (9/10) but his decision after the group discussion was less risky as compared to his initial decision (4/10). Another participant (norm conformity = -2) made a riskier decision than the group and his decision was riskier after the group discussion (7/10) than before the group discussion (8/10).

Table 21.

Cross Tabulation Between Gender and Norm Conformity for Drunk Driving

Norm Conformity	Male (n)	Female (n)	Total (n)
-10	1	0	1
-9	1	0	1
-3	1	0	1
-2	1	0	1
-1	1	1	2
0	7	17	24
1	2	7	9
Total	14	25	39

Note. Positive numbers indicate a more cautious choice compared to the group's decision while a negative number indicates a riskier choice chosen.

The analysis for the outliers failed to produce any significant effects.

Infidelity A

Group polarization – significant interaction effect.

There was a significant interaction effect between gender and individuation information F (1, 146) = 8.732, p = .004.

Table 22.

Effect of Individuating Information on Group Polarization (Infidelity A)

Independent Variables	Num df	Denom df	F	p
Gender	1	146	.290	.591
Individuating Information	1	146	.198	.657
Gender* Individuating Information	1	146	8.732	.004

Further analysis of the interaction effect indicated that there was a significant difference between males and females in the deindividuated condition F (1, 146) = 6.782, p = .01 with males (M = -.097, SE = .378, df = 146) showing a smaller amount of group polarization than females (M = 1.170, SE = .307, df = 146). This implies that females changed their pre and post-discussion opinions more than males did under deindividuation. The question asked for the probability of confronting the man, with zero being that the participant would never confront the man and 10 being that the participant would definitely confront the man. The dependent variable was group polarization, which looked at the difference between the participant's decision after the discussion and the participant's initial decision. Therefore, compared to their pre-

discussion decision deindividuated males changed their post-discussion decision in the direction of not confronting the man while deindividuated females changed their post-discussion decision towards confronting the man.

In addition, there was also a significant difference between males in the individuated and deindividuated conditions F (1, 146) = 4.425, p = .037 as well as a significant difference between females in the individuated and deindividuated conditions F (1, 146) = 4.539, p = .035. For males, those in the individuated condition (M = 1.136, SE = .448, df = 146) showed more group polarization than those in the deindividuated condition (M = -.097, SE = .378, df = 146) while it was opposite for females with those in the individuated condition (M = .260, SE = .297, df = 146) showing less group polarization than those in the deindividuated condition (M = 1.170, SE = .307, df = 146). This implies that compared to their pre-discussion decision, individuated males changed their opinions more after discussion than deindividuated males did, while deindividuated females changed their opinions more after the discussion than individuated females. Also all groups, with the exception of deindividuated males became more confrontational, and the greatest change towards confrontation was found in deindividuated females.

Table 23.

Interaction Between Gender and Individuating Information on Group Polarization (Infidelity A)

Individuating Information	M	SE	F	p
Males				
Individuated	1.136	.448	8.732	.004
Deindividuated	-.097	.378		

Table 23 (Continued)

Females				
Individuated	.260	.297	8.732	.004
Deindividuated	1.170	.307		

Intraclass correlation failed to show significance.

For males, almost as many of them in the deindividuated condition were less willing to confront the man after the discussion (n = 8) as there were males in the individuated condition who were more willing to confront the man after the discussion (n = 10).

Table 24.

Cross Tabulation Between Group Polarization (Infidelity A) and Individuating Information for Males

Group Polarization	Individuated (n)	Deindividuated (n)	Total (n)
-7	0	1	1
-6	0	1	1
-3	0	2	2
-2	1	2	3
-1	0	2	2
0	11	15	26
1	1	5	6
2	4	1	5
3	3	0	3
4	1	0	1

Table 24 (Continued)

5	1	0	1
7	0	1	1
8	0	1	1
Total	22	31	53

Note. Positive numbers indicate that the participant is more likely to confront the man after the discussion while a negative number indicates that the participant is less likely to confront the man after discussion.

For females, there were more of them in the deindividuated condition (n = 21) who were more willing to confront the man after a group discussion, while in the individuated condition, there were nine females who were less likely to confront the man after a group discussion as opposed to 16 females who were more likely to confront the man after a group discussion.

Table 25.

Cross Tabulation Between Group Polarization (Infidelity A) and Individuating Information for Females

Group Polarization	Individuated (n)	Deindividuated (n)	Total (n)
-8	1	0	1
-5	1	0	1
-3	1	0	1
-2	1	0	1
-1	5	1	6
0	25	25	50

Table 25 (Continued)

1	5	7	12
2	6	3	9
3	3	5	8
4	1	4	5
5	0	1	1
6	1	0	1
7	0	1	1
Total	50	57	97

Note. Positive numbers indicate that the participant is more likely to confront the man after the discussion while a negative number indicates that the participant is less likely to confront the man after discussion.

Outliers for Infidelity A – significant interaction effect for group polarization.

An interaction effect was also found for the outliers. There was a significant interaction effect between gender and individuating information F (1, 19) = 5.288, p = .033.

Table 26.

Effect of Individuating Information on Group Polarization (Infidelity A) - Outliers

Independent Variables	Num df	Denom df	F	p
Gender	1	19	.243	.628
Individuating Information	1	19	.432	.519
Gender* Individuating Information	1	19	5.288	.033

Further analysis of the interaction effect indicated that there was a significant difference between males and females in the deindividuated condition F (1, 19) = 5.291, p = .033 with males (M = -1.000, SE = 1.613, df = 19) showing less group polarization than females (M = 4.667 SE = 1.862, df = 19). Males shifted towards non-confrontation while females shifted towards confrontation. In addition, there was also a significant difference between females in the individuated and deindividuated conditions F (1, 19) = 5.191, p = .034. Those in the individuated condition (M = -1.333, SE = 1.862, df = 19) showed less group polarization than those in the deindividuated condition (M = 4.667, SE = 1.862, df = 19). Individuated females shifted towards non-confrontation while deindividuated females shifted towards confrontation.

Table 27.

Interaction Between Gender and Individuating Information on Group Polarization (Infidelity A) - Outliers

Individuating Information	M	SE	F	p
Males				
Individuated	2.333	2.634	5.288	.033
Deindividuated	-1.000	1.862		
Females				
Individuated	-1.333	1.613	5.288	.033
Deindividuated	4.667	1.862		

More males shifted towards not confronting the man after the discussion (n = 7) than confronting the man (n = 4). For females, four females were more likely to confront the man after discussion while eight females were less likely to deal with a confrontation.

Table 28.

Cross tabulation between Group Polarization (Infidelity A) and Gender – Outliers

Group Polarization	Male (n)	Female (n)	Total (n)
-8	0	1	1
-7	1	0	1
-6	1	0	1
-5	0	1	1
-3	2	1	3
-2	3	1	4
4	1	5	6
5	1	1	2
6	0	1	1
7	1	1	2
8	1	0	1
Total	11	12	23

Note. Positive numbers indicate that the participant is more likely to confront the man after the discussion while a negative number indicates that the participant is less likely to confront the man after discussion.

Females in the individuated condition appear to be less likely to confront the man after discussion (n = 5) while those in the deindividuated condition appear to be more likely to confront the man after discussion (n = 6).

Table 29.

Cross tabulation between Group Polarization (Infidelity A) and Identity in Females – Outliers

Group Polarization	Individuated (n)	Deindividuated (n)	Total (n)
-8	1	0	1
-5	1	0	1
-3	1	0	1
-2	1	0	1
4	1	4	5
5	0	1	1
6	1	0	1
7	0	1	1
Total	6	6	12

Note. Positive numbers indicate that the participant is more likely to confront the man after the discussion while a negative number indicates that the participant is less likely to confront the man after discussion.

Infidelity B

Choice shift – significant gender effect.

There was a significant main effect of gender F (1, 72) = 22.525, p = .000. There were no other significant main or interaction effects.

Table 30.

Effect of Individuating Information on Choice Shift (Infidelity B)

Independent Variables	Num df	Denom df	F	p
Gender	1	72	22.525	.000
Individuating Information	1	72	.701	.405
Gender* Individuating Information	1	71	.071	.790

Further analysis of the main effect indicated that males (M = 2.121, SE = .572, df = 72) made greater choice shifts than females (M = -1.171, SE = .391, df = 72). During the group decision, males changed to became more in favor of telling the woman while females grew less in favor of telling. Though not significant, those groups in the individuated condition (M = .204, SE = .490, df = 72) changed less than those in the deindividuated condition (M = .746, SE = .458, df = 72).

Table 31.

Details of the Effects of Gender on Choice Shift (Infidelity B)

Gender	M	SE	F	p
Male	2.121	.572	22.525	.000
Female	-1.171	.458		

The analysis into intraclass correlation failed to reach significance.

This scenario looked at the probability of telling the female friend about the cheating partner. Zero indicated that there was no probability of telling the female friend and 10 indicated that the participant would definitely tell the female friend. As choice shift was calculated by taking the difference between the group decision and the individual decision before group discussion, a positive number would indicate that the participant agreed to a group decision that showed a greater likelihood of telling the friend and a negative number would indicate that the participant agreed to a group decision that was less inclined towards telling the friend.

The data indicates that there were more females who showed a choice shift in the direction of not telling the friend (n = 31) than there were females who showed a choice shift in the direction of telling the friend (n = 11). There were more males who shifted their decisions towards telling the friend (n = 15) than there were males who shifted towards not telling the friend (n = 3).

Table 32.

Cross Tabulation Between Choice Shift (Infidelity B) and Gender

Choice Shift	Male (n)	Female (n)	Total (n)
-5	1	7	8
-4	0	5	5
-3	0	6	6
-2	1	2	3
-1	1	11	12
0	5	9	14
1	3	4	7
2	1	1	2
3	4	4	8
4	3	1	4
5	3	0	3
6	0	1	1
7	1	0	1
8	1	0	1
Total	24	51	75

Note. Positive numbers indicate that the participant agreed to a group decision that is more inclined towards telling the friend and a negative number would indicate that the participant agreed to a group decision that was less inclined towards telling the friend.

Outlier responses for Infidelity B – significant gender effect for choice shift.

There was a significant main effect of gender F (1, 20.811) = 34.06, p = .000. There were no other significant main or interaction effects.

Table 33.

Effect of Individuating Information on Choice Shift (Infidelity B) - Outliers

Independent Variables	Num df	Denom df	F	p
Gender	1	20.811	34.06	.000
Individuating Information	1	11.329	3.741	.078
Gender* Individuating Information	1	20.322	.619	.441

Further analysis of the main effect indicated that males (M = 4.372, SE = 1.202, df = 21.996) made greater choice shifts than females (M = -3.563, SE = .712, df = 13.746). In the group decision, males became more willing to tell the woman while females became less willing to tell the woman.

Table 34.

Details of the Effects of Gender on Choice Shift (Infidelity B) - Outliers

Gender	M	SE	F	p
Male	4.372	1.202	34.06	.000
Female	-3.563	.712		

The variance within groups was 7.047 (SE = 3.898) while the variance between members of the group was 1.771 (SE = 3.997), resulting in an intraclass correlation of 0.2.

Infidelity B

Group polarization – significant gender effect.

There was a significant main effect of gender F (1, 133.787) = 10.393, p = .002. There were no other significant main or interaction effects.

Table 35.

Effect of Individuating Information on Group Polarization (Infidelity B)

Independent Variables	Num df	Denom df	F	p
Gender	1	133.787	10.393	.002
Individuating Information	1	47.900	1.617	.210
Gender* Individuating Information	1	134.96	.071	.400

Further analysis of the main effect indicated that males (M = .722, SE = .273, df = 125.342) showed greater group polarization than females (M = -.316, SE = .209, df = 78.688). Compared to the pre-discussion decision, males were more willing after the discussion to tell the woman what they saw, while females became less willing to tell the woman after the discussion.

Though not significant, those groups in the individuated condition (M = -.02, SE = .260, df = 52.136) changed less than those in the deindividuated condition (M = .427, SE = .245, df = 48.788).

Table 36.

Details of the Effects of Gender on Choice Shift (Infidelity B) - Outliers

Gender	M	SE	F	p
Male	.722	.273	10.393	.002
Female	-.316	.209		

The variance within groups was 3.282 (SE = .467) while the variance between members of the group was .44 (SE = .353), resulting in an intraclass correlation of .118.

Group polarization was obtained by taking the difference between individual's decision after discussion and the individual's decision before discussion. As such, in this scenario, a negative number would indicate that the individual was more inclined to tell the friend before the discussion than after the discussion. A positive number would mean that the individual was more inclined to tell the friend after the discussion as opposed to before the discussion.

The data indicates that 27 females were more inclined to tell their friend about what they saw after the group discussion than they were before the discussion while 24 females were less inclined to tell their friends after the discussion. For males, 7 males were more inclined to tell and 21 males were less inclined to tell.

Table 37.

Cross Tabulation Between Group Polarization (Infidelity B) and Gender

Group Polarization	Male (n)	Female (n)	Total (n)
-8	0	1	1
-7	1	0	1
-5	0	1	1
-4	1	3	4
-3	0	6	6
-2	2	6	8
-1	4	10	14
0	24	46	70
1	6	17	23
2	5	3	8
3	6	3	9
4	0	1	1
5	2	0	2
6	1	0	1
7	1	0	1
Total	53	97	150

Note. Positive numbers indicate that the participant was more inclined to tell the friend after the discussion as opposed to before the discussion and a negative number would indicate that the participant was more inclined to tell the friend before the discussion.

Outlier responses for Infidelity B – significant gender effect for group polarization.

There was a significant main effect of gender F (1, 7.827) = 16.398, p = .004. There were no other significant main or interaction effects.

Table 38.

Effect of Individuating Information on Group Polarization (Infidelity B) - Outliers

Independent Variables	Num df	Denom df	F	p
Gender	1	7.827	16.398	.004
Individuating Information	1	21.065	.765	.392
Gender* Individuating Information	1	22.879	.086	.772

Further analysis of the main effect indicated that males (M = 2.228, SE = 1.022, df = 7.8277) showed greater group polarization than females (M = -2.104, SE = .957, df = 7.827). Again, compared to the pre-discussion decision, males were more willing to tell the woman what they saw, while females were less willing to tell the woman what they saw.

Table 39.

Details of the Effects of Gender on Group Polarization (Infidelity B) - Outliers

Gender	M	SE	F	p
Male	2.228	1.022	16.398	.004
Female	-2.104	.957		

The variance within groups was 2.131 (SE = 1.672) while the variance between members of the group was 13.152 (SE = 4.989), resulting in an intraclass correlation of .861.

Game of Chance A

Norm conformity – significant gender effect.

There was a significant main effect of gender F (1, 57.909) = 6.408, p = .014. There were no other significant main or interaction effects.

Table 40.

Effect of Individuating Information on Norm Conformity (Game of Chance A)

Independent Variables	Num df	Denom df	F	p
Gender	1	57.909	6.408	.014
Individuating Information	1	19.381	.041	.842
Prior Attitude	1	70.322	21.433	.000
Gender* Individuating Information	1	54.946	.054	.816

Further analysis of the main effect indicated that males (M = -.555, SE = .374, df = 59.809) made greater changes than females (M = .499, SE = .278, df = 29.839). This meant that males diverged more from the group decision than females in their post-discussion decision, implying that males conformed less than females. Though not significant, those groups in the individuated condition (M = .022 SE = .366, df =

21.630) changed less than those in the deindividuated condition (*M* = -.077, *SE* = .343, *df* = 20.048).

Table 41.

Details of the Effects of Gender on Norm Conformity (Game of Chance A)

Gender	M	SE	F	p
Male	-.555	.374	6.408	.014
Female	.499	.278		

The variance within groups was 2.545 (SE = .541) while the variance between members of the group was .637 (SE = .536), resulting in an intraclass correlation of .20.

Outlier responses for Game of Chance A – significant gender effect for norm conformity.

There was a significant main effect of gender *F* (1, 15.218) = 5.880, p = .028. There were no other significant main or interaction effects.

Table 42.

Effect of Individuating Information on Norm Conformity (Game of Chance A) - Outliers

Independent Variables	Num df	Denom df	F	p
Gender	1	15.218	5.880	.028
Individuating Information	1	11.668	.331	.576

Table 42 (Continued)

Prior Attitude	1	14.096	.331	.576
Gender* Individuating Information	1	11.394	1.457	.252

Further analysis of the main effect indicated that males (*M* = -2.561, *SE* = 1.133, *df* = 16.953) made greater changes than females (*M* = .733, *SE* = .857, *df* = 14.444). This meant that males diverged more from the group decision than females in their post-discussion decision, implying that males conformed less than females.

Table 43.

Details of the Effects of Gender on Norm Conformity (Game of Chance A) - Outliers

Gender	M	SE	F	p
Male	-2.561	1.133	5.880	.028
Female	.733	.857		

The variance within groups was 3.797 (SE = 2.45) while the variance between members of the group was 4.402 (SE = 3.626), resulting in an intraclass correlation of .537.

Outlier responses for Game of Chance A – significant gender effect for choice shift.

A significant effect for gender *F* (1, 14.484) = 4.659, p = .048 was only found when the analysis was run on the outliers. There were no other significant main or interaction effects.

Table 44.

Effect of Individuating Information on Choice Shift (Game of Chance A) - Outliers

Independent Variables	Num df	Denom df	F	p
Gender	1	14.482	4.659	.048
Individuating Information	1	7.7175	.012	.915
Gender* Individuating Information	1	12.292	.054	.820

Further analysis of the main effect indicated that males (*M* = 2.920, *SE* = 1.702, *df* = 13.007) made greater choice shifts than females (*M* = -1.530, *SE* = -1.530, *df* = 10.683).

Table 45.

Details of the Effects of Gender on Choice Shift (Game of Chance A)

Gender	M	SE	F	p
Male	2.920	1.702	4.659	.048
Female	-1.530	1.416		

The variance within groups was 14.355 (SE = 8.405) while the variance between members of the group was 5.044 (SE = 9.531), resulting in an intraclass correlation of .26.

Game of Chance B

Norm conformity – significant effect for individuating information.

There was a significant main effect of individuating information F (1, 22.755) = 5.322, p = .031. There were no other significant main or interaction effects.

Table 46.

Effect of Individuating Information on Norm Conformity (Game of Chance B)

Independent Variables	Num df	Denom df	F	p
Gender	1	59.164	.001	.970
Individuating Information	1	22.755	5.322	.031
Prior Attitude	1	63.323	.495	.484
Gender* Individuating Information	1	58.898	.004	.947

Further analysis of the main effect indicated that those in the individuated condition (M = .788, SE = .388, df = 25.482) made greater changes than those in the deindividuated condition (M = -.414, SE = .365, df = 23.734).

Table 47.

Details of the Effects of Individuating Information on Norm Conformity (Game of Chance B)

Individuating Information	M	SE	F	p
Individuated	.788	.388	5.322	.031

Table 47 (Continued)

Deindividuated	-.414	.365

The variance within groups was 3.038 (SE = .620) while the variance between members of the group was .670 (SE = .544), resulting in an intraclass correlation of .181.

Outlier responses for Game of Chance B – significant effect for individuating information on norm conformity.

There was a significant main effect of individuating information F (1, 9.711) = 5.924, p = .036. There were no other significant main or interaction effects.

Table 48.

Effect of Individuating Information on Norm Conformity (Game of Chance B) - Outliers

Independent Variables	Num df	Denom df	F	p
Gender	1	11.352	.182	.678
Individuating Information	1	9.711	5.924	.036
Prior Attitude	1	7.813	.394	.548
Gender* Individuating Information	1	13.712	2.732	.121

Further analysis of the main effect indicated that that those in the individuated condition (M = 2.245, SE = 1.036, df = 8.657) made greater changes than those in the deindividuated condition (M = -1.660, SE = 1.240, df = 11.041).

Table 49.

Details of the Effects of Individuating Information on Norm Conformity (Game of Chance B) - Outliers

Individuating Information	M	SE	F	p
Individuated	2.245	1.036	5.924	.036
Deindividuated	-1.660	1.240		

The variance within groups was 8.626 (SE = 5.596) while the variance between members of the group was 2.371 (SE = 5.541), resulting in an intraclass correlation of .216.

Game of Chance B

Group polarization – significant effect for individuating information.

There was a significant main effect of individuating information F (1, 147) = 5.678, p = .018. There were no other significant main or interaction effects.

Table 50.

Effect of Individuating Information on Group Polarization (Game of Chance B)

Independent Variables	Num df	Denom df	F	p
Gender	1	147	.098	.213
Individuating Information	1	147	5.678	.018
Gender* Individuating Information	1	147	.650	.421

Further analysis of the main effect indicated that those in the individuated condition (*M* = .236, *SE* = .326, *df* = 147) had smaller group polarization than those in the deindividuated condition (*M* = -.806, *SE* = .305, *df* = 147).

Table 51.

Details of the Effects of Individuating Information on Group Polarization (Game of Chance B)

Individuating Information	M	SE	F	p
Individuated	.236	.326	5.678	.018
Deindividuated	-.806	.305		

Intraclass correlation failed to reach significance.

Outlier responses for Game of Chance B – significant effect of individuating information for group polarization.

There was a significant main effect of individuating information *F* (1, 15) = 7.695, p = .014. There were no other significant main or interaction effects.

Table 52.

Effect of Individuating Information on Group Polarization (Game of Chance B)

Independent Variables	Num df	Denom df	F	p
Gender	1	15	.015	.903
Individuating Information	1	15	7.695	.014

Further analysis of the main effect indicated that those in the individuated condition (M = 2.906, SE = 2.262, df = 15) made had smaller group polarization than those in the deindividuated condition (M = -5.3, SE = 1.907, df = 15).

Table 53.

Details of the Effects of Individuating Information on Group Polarization (Game of Chance B) - Outliers

Individuating Information	M	SE	F	p
Individuated	2.906	2.262	7.695	.014
Deindividuated	-5.300	1.907		

Intraclass correlation failed to reach significance.

CHAPTER 6

DISCUSSION

This study focused on online decision-making and examined whether normative influence is a factor in online opinion change. In doing so it also looked at the effects of group identity as well as the effects of content on group and individual decision-making. In particular, the purpose of this research was to find out (a) the effect of normative influence on individual and group decision-making; (b) the effect of consensus on individual decision-making and; (c) if the nature of the issue being decided had an effect on group and individual decision-making.

How is This Study Different?

An important area in which this study differs from previous studies is the way that the online conversations were conducted. The conversations were not controlled and the participants were allowed to discuss the issues freely. Some studies, for example those by Lee and Nass (2002) as well as those by Lee (2006; 2007) have involved the use of computer-simulated conversations whereby the participants were presented with pre-programmed responses instead of conversing with actual participants. In such settings, the "conversations" consisted of pre-programmed answers and justifications for these answers and did not allow for any questions or clarifications. In the current study, participants interacted with other participants instead of a computer. Allowing for a free-flowing conversation more closely approximates a natural conversation similar to what would take place on a bulletin

board or a chat room as opposed to a laboratory-induced conversation. It examined group interaction in a *realistic* setting.

A second difference was the lack of a group norm. Research on decision-making in CMC has often employed the imposition of a group norm. In other studies, such as that of Spears, Lee and Lea (1990), the group norm was imposed and did not grow out of intragroup interaction. Rather prior to the group discussion, participants were presented with survey data ostensibly collected from their peers, which favored one position on a controversial issue, and polarization was defined as the extent to which post-discussion attitudes moved towards this pre-established norm. Another alternative in which the group norm is given is through the use of computer-simulated responses. In some experiments, participants are told that they would be interacting with other university students. In actuality, a computer program would supply the responses. Lee and Nass (2002) conducted an experiment in which the computer program provided all the responses but it appeared to the participant that several other people were participating as well. The other "participants" always gave their answers first and the participant always went last. In other experiments, the participant would give an answer and the computer program would provide answers for "participants" who either unanimously supported or opposed the answer (Lee, 2006, 2007) In this way, the pressure to conform was manipulated. In this study, no such norm is imposed upon the group and the group norm was left to arise spontaneously out of the group discussion.

This study also attempted to replicate the original choice shift methodology in which the participants were asked for their individual opinions before and after the discussion. In other studies, participants saw the scenarios online and proceeded to give their answers online and then again privately after the discussion's conclusion. Attitude change, or group polarization was thus measured as the difference between

the norm and the individual decision after discussion (Lee, 2006, 2007; Lee & Nass, 2002). However, this definition of group polarization differs from that employed by the original choice shift studies. This study thus measures not only this difference between the norm and the post-discussion decision, which was termed here as norm conformity, it also attempted to measure the difference between the individual's decision before and after the discussion (group polarization) as well as the difference between the pre-discussion difference and the group decision (choice shift) as defined in the original literature.

Last but not least, this study also differs from previous CMC studies in that it required half of the groups to come to a unanimous decision in order to examine the effects of consensus on decision-making. Past studies did not ask the group to come to a consensus. Instead they normally required the group to either just participate in a discussion or come to a majority decision.

Effect of Normative Influence on Decision-Making

Research question 1 examined the effects of normative influence on decision-making. From the analyses in hypotheses 1, 2 and 3, it appears that normative influence does not seem to affect norm conformity, group polarization or choice shift. The data did not support the first three hypotheses as there was no significant difference between the decisions made by those in the individuated groups and those in the deindividuated groups. As such, this implies that normative influence does not affect decision-making. As the hypotheses were not supported, it might be that informational influence and persuasive arguments that were in operation rather normative influence. However, there might be other explanations as to why the hypotheses were not supported.

One reason for the lack of significant findings in the first three hypotheses is due to the nature of the dependent variables. In these three hypotheses, these dependent variables were composite variables. That is, each variable was constructed by adding up the corresponding variables across all eleven scenarios. As shown in hypotheses five and six, the content of the issue has an effect on these variables. Therefore, by constructing the composite variables, the first three hypotheses failed to take into account the effect of content. When the analyses was run on each of the scenarios separately, it was shown that normative influence was working in some of the scenarios (drunk driving and infidelity) but not in others. Hence the use of composite variables was not appropriate.

Another explanation for the inability to find the normally highly consistent phenomenon of group polarization could be a temporal one. Previous SIDE studies have failed to factor in the social effects component of communication. With such short timeframes to work in, it would have been difficult to complete the task objectives, let alone think about relational concerns. In this study, the chat sessions lasted between 45 to 75 minutes per session. In comparison, most studies that looked at online opinion change had the groups interacting for much shorter periods of time. Having an online chat session for only a short time frame does not allow for much social information to be exchanged. Furthermore, in some studies (e.g.: Lee, 2006, 2007), the conversation consisted of an exchange of answers and their justifications, without the possibility for questions or clarifications. It was unlikely that much social information processing would have been going on in such situations.

In the present study, with the amount of time expended in each conversation extending to 45 minutes or more, much more information can be exchanged and participants can get to form distinct impressions of each other as individuals. A lengthened timeframe might have diluted the effect of the individuating information

and hence resulted in the lack of significant findings despite the study manipulating individuating information in a manner similar to that of previous studies. In this study, the participants had to justify their answers and even though they were anonymous, participants could have attributed certain characteristics to each other as a result of the answers and justifications given. In the course having to go through eleven scenarios, impressions could have been formed that individuated the participants. Therefore there is the possibility that due to the longer time frame, individuation could be happening even in the deindividuated groups as participants interacted and got to know each other better.

Taylor and MacDonald (2002) found a temporal difference in group polarization. In a replication of Spears, Lea and Lee (1990) study in which identifiability (high/low) and group salience (high/low) were manipulated, they found the predicted effects occurred at the beginning and middle of the interaction but not at the final post-discussion stage of the interaction. McGrath and Hollingshead (1993) arrived at a similar conclusion in their work which emphasizes the importance of intra-group dynamics and temporal issues in computer-supported groups. They suggested that it was normally during the early stages of group development that group members tried to establish and understand the norms of the group, and to obtain a basis of influence over the decision process. CMC may therefore have significant effects on groups at the early stage of group development because it permits members to focus more rapidly and intensely on the task itself. The results here suggest that opinion polarization in CMC may not be as widespread a phenomenon as previously suggested.

This temporal explanation would fit well with Walther's (1992; 1996) Social Information Processing (SIP) Theory, which highlights the fact that social information is still being exchanged in CMC but at a slower pace than what would normally occur

in FTF communication. SIP assumes that communicators in CMC are driven to develop social relationships. This results in the accumulation of interpersonal information about other participants and develops relational communication among them. SIP thus posits that CMC is similar to other forms in communication in that its participants still take part in relational communication. They sought to minimize uncertainties, form impressions and develop affinities. Research has also shown that very little motivation or identity issues need be salient in order for communicators to adapt their relational behaviors effectively across channels (Walther, Loh, & Granka, 2005). SIP argues that impressions and relational communication improve in CMC parallel to that in FTF communication over time, precisely due to the development of personal knowledge structures of one's partners (Walther, 1992).

Effect of Consensus on Decision-Making

Although the pairwise comparisons showed that participants who had to come to a decision showed greater polarization than those in the discussion condition, however the results failed to reach significance and therefore the hypothesis was not supported. Hence the data suggests that having to come to a group decision did not influence opinion change.

It is unclear at the points as to why the need to come to a decision did not affect norm conformity, choice shifts and group polarization. One explanation might be that the issues presented were not personally relevant to the participants, and as such cognitive processing was peripheral in nature (Petty, Cacioppo, & Goldman, 1981; Petty, Priester, & Brinol, 2002). Less thoughtful message processing might have lead to a greater reliance on normative considerations in both decision and discussion conditions. It might have been just easier for the participants to "go with

the flow" and to cognitively take path of least resistance, rather than to think through the arguments presented to come up with their own post-discussion decisions.

Effect of Story Content/Issue Type

The data indicated that the content—risk, moral or intellectual—of the issue under consideration had an effect on choice shift and group polarization but not on norm conformity. Choice shifts were greater for risk issues than for intellectual or moral issues. However, the difference between risk and moral issues was not significant. Thus, the participants' group decision shifted most from their original decision when it came to risk issues. However, rather than a shift in the direction of being more risky, results indicated that the participants endorsed a group decision that was more cautious than their own initial decision. For moral issues, they endorsed a group decision that was more confrontational than their own. An interaction effect between gender and content was also observed, with males making a greater choice shift than females in intellectual issues and males making a greater shift in intellectual issues than in moral or risk issues.

For group polarization, there was a greater group polarization for risk issues, than for intellectual or moral issues. The data showed that in the risk issues, the participants became more cautious after the group discussion than before the group discussion while for the moral issues, the participants became more confrontational after the group discussion than before the group discussion. Pairwise comparisons showed that there was a significant difference between the mean differences of risk and intellectual issues, as well as a significant difference between moral and intellectual issues but the difference between risk and moral issues was not significant. As for norm conformity, although story content failed to reach significance however,

pairwise comparison found a significant difference between the mean difference for risk and intellectual issues.

This research has shown support for the assertion that content of the issue under discussion affects the changes in decision-making and it suggests that there is a difference between the way that people respond to risk, intellectual and moral issues. People respond differently to risk and moral issues as opposed to intellectual issues and this nicely illustrates the point made by Epstein (1994) that people understand reality via the analytic as well as the intuitive ways, and that we utilize both an analytic system and a experiential system when we make decisions (Slovic et al., 2004).

Since there were no significant differences between risk and moral issues, it suggests that risk and moral issues are qualitatively different from intellectual issues, but perhaps not from each other. This would lend support to the proposition that the issues on which groups make decisions lie along a continuum, with intellectual issues being on one end of the continuum and moral/judgmental issues being on the other end (Laughlin, 1980; Laughlin & Earley, 1982). The data seem to indicate that risk might belong on the same end of the spectrum as moral issues whereby instead of a correct answer, risk issues involve behavioral, ethical or aesthetic judgments for which there are no demonstrably correct answers. In risk issues, similar to moral issues, the right answer is achieved by reaching consensus.

One unexpected finding was that of the effect of gender. When testing the effect of content on choice shifts, there was an interaction effect between gender and content, with males making a greater choice shift than females in intellectual issues and males making a greater shift in intellectual issues than in moral or risk issues. An analysis of the intellectual issues showed that this change occurred mainly in the

outliers. Intellectual issues having a demonstrably correct answer would make it is easier to convince people to change their minds once the right answer is shown.

Effect of Individual Scenarios

Not only does norm conformity, choice shift and group polarization have different effects depending on the story content, the different scenarios affect choice shift, group polarization and norm conformity differently. For risk issues, the only significant effect was for drunk driving which had that an interaction effect on norm conformity. For moral issues, there was interaction effect for group polarization on Infidelity A and gender effect for choice shifts and group polarization on Infidelity B. For intellectual issues, there was a gender effect for norm conformity on Game of Chance A and an individuating information effect for norm conformity and group polarization for Game of Chance B.

In the risk issue of drunk driving, deindividuation affects males and females differently, with males showing less conformity than females. Instead they moved and away from the group decision in the direction of risk while females moved in the direction of caution. This is in line with the literature in which women are more susceptible to group pressure and conform more than men do in group decision-making (Eagly, 1983). It is of interest that males and females moved in opposite directions when deindividuated.

For moral issues, individuating information affects males and females differently. Individuating information elicits opposite reactions from males and females. Deindividuated females changed their pre and post-discussion opinions more than individuated females did and individuated males changed their pre and post-discussion opinions more than deindividuated males did. It appears that

deindividuation affects attitude change in females, making them conform more to the group norm. When deindividuated, females showed greater change between the pre and post-discussion opinions than males, with females changing towards confrontation and males towards non-confrontation. All groups with the exception of deindividuated males, showed a movement towards confrontation with the greatest change towards confrontation being in deindividuated females. Therefore it seems like for moral issues, individuating information has an effect on both males and females, but in opposite directions. However, when it came to speaking out to their friend, only gender made a difference. Males showed greater change between their own decision and the group decision and between their pre and post-discussion decisions. Males became more willing to speak out but females became less willing to do so.

For intellectual issues, in Game of Chance A, males conformed less than females. However, when it came to the outliers, males showed greater choice shift than females, which meant that when it came to the group decision, males changed more to conform to the group decision, while females changed less. For Game of Chance B, individuating information had an effect, with participants in the individuated condition conforming less than those in the deindividuated condition. The same result was found for the outliers. In addition, deindividuated participants showed greater group polarization than individuated participants. The same result was found for the outliers.

Therefore not only does the content of the discussion have an effect on decision-making, but the individual's gender also affected the responses gives. Deindividuation appears to affect females in that it makes them more susceptible to group influence.

Implications and Future Research

This study has examined how normative influence and content has affected decision-making. By looking at the various aspects of decision-making such as choice shift, group polarization and norm conformity, it has enriched the literature by adapting the traditional choice shift research to a new medium, and by examining whether and in what ways group and individual identities affect decision-making.

One finding of this study is that the content being discussed affects decision-making and opinion change. People react to risk and moral issues much differently than they do to intellectual issues. Hence the nature of the task should be considered in group polarization research. This has implications for the online groups, especially social support groups and advocacy groups as the nature of their discussions would revolve around risk and moral issues as opposed to intellectual issues. Although this study examined the risk, moral and intellectual issues, however the scenario concerning bird flu, which was a risk issue and the scenario concerning pregnancy/abortion which was a moral issue did not produce any significant effects. One reason could be that the participants were all college students and hence they were better able to relate to issues such as drunk driving and relationship problems. This is a problem with most choice-shift research, which ask for solutions to third-person hypothetical situations that are often difficult for the college-aged participants to relate to. Future research should replicate the study with other scenarios that are more applicable to the participants.

Another finding, albeit an expected one is that of the effect of gender. Previous studies that have taken gender into consideration have looked at group satisfaction and gender (Savicki, Kelly, & Lingenfelter, 1996), gender perceptions and expectations (Matheson, 1991), gender communication styles (Duran & Carveth, 1990) and gender stereotyping (Nass and Moon, 2000; Reeves and Nass, 1996). However, most online

choice shift studies do not examine gender specifically. Gender should thus be taken into consideration in future studies as males and females react differently to both content and the amount of individuating information. That males and females react in opposite directions especially under deindividuation has implications for online social support groups. Social support groups that cater to women need to be aware of the possibility that their participants might be susceptible to the effect of group influence and norm conformity.

This study also pointed out a problem with the SIDE mode. Past SIDE research has often overlooked the possible effect of time on the group discussion. The longer time frame for group discussion as provided in this study might have allowed individuation to occur, even in the deindividuated groups. SIDE might have been able to provide an explanation for the group processes that occur in the earlier stages of CMC interaction but it does not hold true when group members start to get to know better, regardless of their state of individuation. Further research needs to focus on those changes in attitude, which occur at the beginning of the discussion instead of just collecting measurements of attitude before and after the discussion as is the case in most polarization research. Although anonymity and deindividuation do occur in online bulletin boards and chat rooms, it is more likely than not that individuals are not as completely deindividuated as the participants are in SIDE experiments.

The desire for a more naturalistic setting for the group setting unfortunately led to several limitations in this study. One limitation was that the group norm was left to develop on its own unlike previous studies in which the group norm was explicitly given or manipulated. There was therefore less control over the interaction and as a result a strong or unified group norm might not have emerged. This study did not measure the strength of the perceived group norm and this is one area that future research might want to explore further.

A more naturalistic setting also resulted in the inability to control for the amount or diversity of informational influence. Although all participants were provided with the same scenarios, which contained the same information, but due to the naturalistic condition, there was no control for what additional information that the participants brought in to the conversation. A possible control of this in future experiments would be the use of confederates which would help regulate the conversation yet at the same time allow for greater spontaneity than pre-programmed computer-generated responses

There was also a lack of opposing views and heterogeneity in the initial position. Opinion change would logically occur only in the face of opposing views and this lack of opposing views and heterogeneity might have hampered any measurement of change. According to Singleton (1979), the direction of the shift depends upon the distribution of initial choices in the total population. A divergence of views is a prerequisite for "deviant" responses whose movement toward an implicit group norm, according to conformity theory, results in "group-induced" shifts. Group heterogeneity appears to be a necessary condition for choice shifts and for the initiation of group processes that evoke the shifts. The data showed that the mode for norm conformity, group polarization and choice shifts was often zero, implying a lack of opinion change. Most of the participants had moderate opinions towards the issues presented and the range of shift was therefore relatively restricted.

Yet another possibility was that the participant's initial decision was the product of predeliberation normative influence. According to Henningsen and Henningsen (2004), if the preferences of other group members are not know, people have the tendency to endorse moderate positions in their initial decisions so as to allow for flexibility and to appear open-minded. This is especially so when they anticipate participating in a group discussion.

Another variable that might have contaminated the results was the extremity of the some of the participants' initial preference. Lee (2008) suggests that for those participants who hold extreme opinions, this extremity of opinion might reflect how confident the participant was about his or her own decision. In such a case, those holding more extreme opinions would have been less likely to change their preferences due to greater self-confidence.

This study has contributed to the understanding of how content and gender affect group decision-making in CMC. In addition, this research hoped to have advanced current understanding of the impact of group identification on the decision-making process. Further research needs to explore other factors that affect online group decision-making such as temporal factors and the social and psychological processes that are activated when different types of content, in particular risk content is being discussed. This research highlights the fact that perhaps some group processes, such as group polarization occur differently in naturalistic computer-mediated group setting what has been shown previously in the literature.

APPENDIX 1

CHOICE DILEMMA QUESIONNAIRE

Case #: _____

Instructions:

On the following pages, you will find a series of situations. In each situation, you will be asked to indicate the probabilities (0 to 100%) that you are willing to take.

Read each situation carefully before giving your judgment. There are 6 situations in total. Please do not omit any of them.

BIRD FLU

Bird flu has been confirmed in several parts of New York State but the CDC has yet to issue an alert. It is in the middle of the semester and so classes and exams are still in session. Failure to attend classes and the exams will result in a much lower GPA. However, you also know that bird flu is a highly contagious disease which is often fatal when contracted.

Please indicate the lowest probability that you would consider acceptable to make it worthwhile for you to go to classes and to take the exams.

_____ I will NOT go to classes and take the exams if there was 0% chance that I will contract the disease.
_____ I will NOT go to classes and take the exams if there was 10% chance that I will contract the disease.
_____ I will NOT go to classes and take the exams if there was 20% chance that I will contract the disease.
_____ I will NOT go to classes and take the exams if there was 30% chance that I will contract the disease.
_____ I will NOT go to classes and take the exams if there was 40% chance that I will contract the disease.
_____ I will NOT go to classes and take the exams if there was 50% chance that I will contract the disease.
_____ I will NOT go to classes and take the exams if there was 60% chance that I will contract the disease.
_____ I will NOT go to classes and take the exams if there was 70% chance that I will contract the disease.
_____ I will NOT go to classes and take the exams if there was 80% chance that I will contract the disease.
_____ I will NOT go to classes and take the exams if there was 90% chance that I will contract the disease.
_____ I will NOT go to classes and take the exams if there was 100% chance that I will contract the disease.

What decision do you think that the majority of people like yourself would make?
_____ %

****

DRUNK DRIVING

It is in the middle of winter and you are at a party and all your friends have already left. It is 3am and you are really tired and all you want to do is to get home as fast as possible. You need to sleep as you have to get up early for a very important appointment. However, the party is located very far from all forms of public transportation and although you could walk home, it would take you more than an hour to walk home. An acquaintance that you have just met at the party offers you a ride home. It is also clear that he has had way too much to drink and is in no condition to drive. Furthermore, the roads are very icy.

Please state the lowest probability that you would consider acceptable to make it worthwhile for you to take up the offer of a ride.

_____ I will take the ride if there was 0% chance of NOT getting into an accident.
_____ I will take the ride if there was 10% chance of NOT getting into an accident.
_____ I will take the ride if there was 20% chance of NOT getting into an accident.
_____ I will take the ride if there was 30% chance of NOT getting into an accident.
_____ I will take the ride if there was 40% chance of NOT getting into an accident.
_____ I will take the ride if there was 50% chance of NOT getting into an accident.
_____ I will take the ride if there was 60% chance of NOT getting into an accident.
_____ I will take the ride if there was 70% chance of NOT getting into an accident.
_____ I will take the ride if there was 80% chance of NOT getting into an accident.
_____ I will take the ride if there was 90% chance of NOT getting into an accident.
_____ I will take the ride if there was 100% chance of NOT getting into an accident.

What decision do you think that the majority of people like yourself would make?
_____ %

****

PREGNANCY

Your sister has approached you with a serious predicament. She is pregnant. She has been dating a young man for five months. Since they are young, age 19, they have no plans on getting married. She has not mentioned this to anyone. Your parents are strict Catholics, and yet, she is considering an abortion.

The probability of me trying to talk her out of the abortion is
_____ 0%
_____ 10%
_____ 20%
_____ 30%
_____ 40%
_____ 50%
_____ 60%
_____ 70%
_____ 80%
_____ 90%
_____ 100%

What decision do you think that the majority of people like yourself would make?
_____ %

****

INFIDELITY

Two good friends of yours are getting married in a few weeks. They are a young couple and have been dating for three years. One evening, while you are out dining, you notice the male across the room. He is displaying very affectionate, unmistakable intimate behavior with another female. What would you do?

a) The probability of me confronting the male is
_____ 0%
_____ 10%
_____ 20%
_____ 30%
_____ 40%
_____ 50%
_____ 60%
_____ 70%
_____ 80%
_____ 90%
_____ 100%

b) The probability of me telling my female friend is
_____ 0%
_____ 10%
_____ 20%
_____ 30%
_____ 40%
_____ 50%
_____ 60%
_____ 70%
_____ 80%
_____ 90%
_____ 100%

What decision do you think that the majority of people like yourself would make
For (a)? _____ %
For (b)? _____ %

****

THE DISEASE PROBLEM

Imagine that the United States is preparing for the outbreak of an unusual disease, which is expected to kill 600 people. Four alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows:

If Program A is adopted, 200 people will be saved but the rest will die. If Program B is adopted, there is a one-third probability that 600 people will be saved and a two-thirds probability that no people will be saved. If Program C is adopted, 400 people will die. If Program D is adopted, there is a one-third probability that nobody will die and a two-thirds probability that 600 people will die.

Please tick the probability that you would consider it acceptable to choose Program A
_____ 0%
_____ 10%
_____ 20%
_____ 30%
_____ 40%
_____ 50%
_____ 60%
_____ 70%
_____ 80%
_____ 90%
_____ 100%

Please tick the probability that you would consider it acceptable to choose Program B
_____ 0%
_____ 10%
_____ 20%
_____ 30%
_____ 40%
_____ 50%
_____ 60%
_____ 70%
_____ 80%
_____ 90%
_____ 100%

Please tick the probability that you would consider it acceptable to choose Program C
_____ 0%
_____ 10%
_____ 20%

_____ 30%
_____ 40%
_____ 50%
_____ 60%
_____ 70%
_____ 80%
_____ 90%
_____ 100%

Please tick the probability that you would consider it acceptable to choose Program D
_____ 0%
_____ 10%
_____ 20%
_____ 30%
_____ 40%
_____ 50%
_____ 60%
_____ 70%
_____ 80%
_____ 90%
_____ 100%

What decision do you think that the majority of people like yourself would make?
For Program A _____ %
For Program B _____ %
For Program C _____ %
For Program D _____ %

****

GAME OF CHANCE
Imagine that you face the following pairs of concurrent decisions.

Decision 1: Choose between the following:
A) A sure gain of $240
B) 25% chance to gain $1000 and 75% chance to gain nothing

Decision 2: Choose between the following:
C) A sure loss of $750
D) 75% chance to lose $1000 and 25% chance to lose nothing

Please tick the probability that you would chose option A over option B
_____ 0%
_____ 10%
_____ 20%
_____ 30%
_____ 40%
_____ 50%
_____ 60%
_____ 70%
_____ 80%
_____ 90%
_____ 100%

Please tick the probability that you would chose option C over option D
_____ 0%
_____ 10%
_____ 20%
_____ 30%
_____ 40%
_____ 50%
_____ 60%
_____ 70%
_____ 80%
_____ 90%
_____ 100%

What decision do you think that the majority of people like yourself would make?
For Decision 1 _____ %
For Decision 2 _____ %

APPENDIX 2

MANIPULATION FOR DEINDIVIDUATED GROUPS

Instructions before group discussion

This is a note regarding your computer-mediated communication. You have been assigned to a group for your discussion. The whole group has the same major.

These are YOUR GROUP'S instructions.

One of the advantages of working in groups is that the group forges a distinctive identity for itself that can lead to higher quality outcomes. As you work on your group project, try to assess the group's characteristics. What are the things that identify your group and make it different from other groups? Please list those characteristics below.

You are to begin working on the first scenario right away.

Group's characteristics:

Other comments:

APPENDIX 3

MANIPULATION FOR INDIVIDUATED GROUPS

Instructions before discussion

This is a note regarding your computer-mediated communication. You will be working with several different students. Each student has a different major.

These are YOUR INDIVIDUAL instructions.

One of the advantages of working with others is that the diversity of unique individuals can lead to higher quality outcomes. As you work on the scenarios with the others, try to assess the characteristics of each person. What are the things that identify them as individuals and make them different from one another? Please list those characteristics below.

You are to begin working on the first scenario right away, and you might like to start by firstly saying a little about yourself (e.g.: hobby/favorite TV show/movie/music etc) without disclosing identifying information.

Individual ___'s characteristics:

Individual ___'s characteristics:

Other comments:

APPENDIX 4

MEASURES

First we want to ask you some questions about your relation to the group taking part in the discussion (which we will refer to as 'this group'). For each statement, please circle a number from 1 to 7 to indicate how well the statement applies to your thoughts and feelings at the moment. That is, the 'Not at all' and 'Very Much' labels refers to the degree of fit between a statement, and your current feelings and thoughts. Please read each question carefully.

Group identity measures (adapted from Spears, Lea, & Lee, 1990)
1. To what extent do the students in this group differ from each other?
2. To what extent is this group unique, unlike other groups?
3. How similar to each other are the students in this group?
4. I see myself as a member of this group.
5. I regard this group as important.

Shared identity measure (adapted from Tyler, T. R., 1999)
6. I felt loyal toward the group.
7. I was pleased to be a member of the group.
8. I felt I was on my own during the project.

Identity measure (adapted from Spears, Lea, & Lee, 1990)
9. I feel uneasy with the other students in this group

10. I feel a bond with other students in this group

11. I consider the opinions of the other students in this group to be important
12. I feel I can rely on the other students in this group for support

Task attraction measure (adapted from McCrosky & McCain, 1974)
13. If I was taking part in another project, I would like to do it with the students in this group

Group cohesion measure (adapted from Seashore, 1954)
14. To what degree did you feel that you are really a part of your group?
15. If you had a chance to do the same task in another group, how would you feel about moving?
16. How does your group compare with other groups on the way people get along together?

17. How does your group compare with other groups on the way people stick together?
18. How does your group compare with other groups on the way people help each other on the task?

We would like to ask you some questions about your feelings on the group discussion. For each statement, please circle a number from 1 to 7 to indicate your satisfaction level. “1” indicates very dissatisfied, “7” indicates very satisfied.

How satisfied ARE you with:

Group satisfaction measure (adapted from Gouran, 1973)
19. The solution that the group reached?
20. The process by which your group evaluated ideas?
21. The group’s overall performance?
22. Your own contribution in this group discussion?
23. Your own contribution to the group’s decision?
24. Being a member of this group?
25. Other members’ evaluation of ideas and solutions?
26. The solution reached being the best possible one?

REFERENCES

Adrianson, L. (2001). Gender and computer-mediated communication: group processes in problem solving. *Computers in Human Behavior, 17*, 71-94.

Adrianson, L., & Hjelmquist, E. (1999). Group processes in face-to-face and computer-mediated communication. *Behavior and Information Technology, 10*, 281-296.

Alhakami, A. S., & Slovic, P. (1994). A psychological study of the inverse relationship between perceived risk and perceived benefit. *Risk Analysis, 14*, 1085-1096.

Bickel, R. (2007). *Multilevel analysis for applied research – It's just regression!* NYC, NY: Guildford Press.

Braithwaite, D. O., Waldron, V. R., & Finn, J. (1999). Communication of social support in computer-mediated groups for persons with disabilities. *Health Communication, 11*, 123-151.

Brown, R. (1965). *Social psychology*. New York: Free Press of Glencoe.

Browne, W. J., & Rasbash, J. (2000). *Multilevel modelling*. London: Institute of Education, University of London.

Burgoon, J. K., & Hale, J. L. (1988). Nonverbal expectancy violations: Model elaboration and application to immediacy behaviors. *Communication Monographs, 55*, 58-79.

Burnstein, E., & Vinokur, A. (1977). Persuasive argumentation and social comparisons as determinants of attitude polarization. *Journal of Experimental Social Psychology, 13*, 315-332.

Clark, R. D., III, & Crockett, W. H. (1971). Subjects' initial positions, exposure to varying positions, and the risky shift. *Journal of Experimental Social Psychology, 9*, 236-245.

Clark, R. D. I., Crockett, W. H., & Archer, R. (1971). Risk-as-value hypothesis: The relationship between perception of self, others and the risky shift. *Journal of Personality and Social Psychology, 20*, 425-429.

Cramton, C. D. (2002). Attribution in distributed work groups. In P. J. Hinds & S. Kielser (Eds.), *Distributed work*. (pp.191-212). Cambridge, MA: MIT Press.

Damasio, A. R. (1994). *Descartes error: emotion, reason and the human brain*. New York: G.P. Putnam's Sons.

DiBerardinis, J., Ramage, K., & Levitt, S. (1984). Risky shift and gender of the advocate: Information theory versus normative theory. *Group and Organizational Studies, 9*, 189-200.

Downing, J. D. H. (2001). *Radical media: rebellious communication and social movements.* Thousand Oaks, CA: Sage.

Dubrovsky, V., Kiesler, S., & Sethna, B. (1991). The equalization phenomenon: Status effects in computer mediated and face-to-face decision making groups. *Human-Computer Interaction, 6*, 119 -146.

Duran, R. L., & Carveth, R. A. (1990). The effects of gender-role expectations upon perceptions of communication competence. *Communication Research Reports, 7*(1), 25-33.

Eagly, A. H. (1983). Gender and social influence: A social psychologist analysis. *American Psychologist, 38*, 971-981.

Ebbeson, E. B., & Bowers, R. J. (1974). Proportion of risky to conservative arguments in a group discussion and choice shift. *Journal of Personality and Social Psychology, 29*, 316-327.

Epstein, S. (1994). Integration of the cognitive and the psychodynamic unconscious. *American Psychologist, 49*, 709-724.

Festinger, L. (1954). A theory of social comparison processes. *Human Relations, 7*, 117-140.

Finucane, M. L., Alhakami, A. S., Slovic, P., & Johnson, S. M. (2000). The affect heuristic in judgments of risk and benefits. *Journal of Behavioral Decision Making, 13*, 1-17.

Fischhoff, B., Slovic, P., Lichtenstein, S., Read, S., & Combs, B. (1978). How safe is safe enough? A psychometric study of attitudes towards technological risks and benefits. *Policy Sciences, 9*, 127-152.

Foss, R. D. (1981). Structural effects in simulated jury decision making. *Journal of Personality and Social Psychology, 40*, 1055-1062.

Fox, N. J., Ward, K. J., & O'Rourke, A. J. (2005). The 'expert patient': empowerment or medical dominance? The case of weight loss, pharmaceutical drugs and the Internet. *Social Science & Medicine, 60*, 1299-1309.

Fox, S. (August 2006). Online Health Search 2006. Retrieved April 10, 2008, from http://www.pewinternet.org/PPF/r/190/report_display.asp

Fraser, C., Gouge, C., & Billig, M. (1970). Risky shifts, cautious shifts, and group polarization. *European Journal of Social Psychology, 1*, 7-30.

Freudenburg, W. R. (1988). Perceived risk, real risk: Social science and the art of probabilistic risk assessment. *Science, 242*, 44-49.

Ganzach, Y. (2001). Judging risk and return of financial assets. *Organizational Behavior and Human Decision Processes, 83*, 353-370.

Henningsen, D. D., & Henningsen, M. L. M. (2004). Pre-deliberation moderation on choice dilemmas: Proposing a moderation-elasticity theory of choice shift. *Communication Monographs, 71*, 148-160.

Hiltz, S. R., Turoff, M., & Johnson, K. (1989). Experiments in group decision making: Disinhibition, deindividuation, and group process in pen name and real name computer conferences. *Decision Support Systems, 5*, 217-232.

Hogg, M. A., Turner, J. C., & Davidson, C. I. (1990). Polarized norms and social frames of reference: A test of the self-categorization theory of group polarization. *Basic and Applied Social Psychology, 11*, 77-100.

Horrigan, J. B., Rainee, L., & Fox, S. (2001). *Online communities: Networks that nurture long-distance relationships and local ties*. Retrieved 11 February 2008 from http://www.pewinternet.org/PPF/r/47/report_display.asp

Hox, J. J. (1995). *Applied multilevel analysis*. Amsterdam: TT-Publikaties.

Isenberg, D. J. (1986). Group polarization: A critical review and meta-analysis. *Journal of Personality and Social Psychology, 50*, 1141-1151.

Jellison, J. M., & Riskind, J. A. (1970). A social comparison of abilities interpretation of risk-taking behavior. *Journal of Personality and Social Psychology, 15*, 375-390.

Jessup, L. M., Connolly, T., & Galegher, J. (1990). The effects of anonymity on group processes in an idea generating task. *MIS Quarterly*, 313-321.

Kaplan, M. F. (1989). Task, situational, and personal determinants of influence process in group decision making. *Advances in Group Processes, 6*, 87-105.

Kaplan, M. F., & Miller, C. E. (1987). Group decision making and normative versus informational influence: Effects of type of issue and assigned decision rule. *Journal of Personality and Social Psychology, 53*, 306-313.

Kasperson, R. E. (1992). The social amplification of risk: progress in developing an integrative framework. In S. Krimsky & D. Golding (Eds.), *Social theories of risk* (pp. 153-178). Westport, Conn: Praeger Publishing Company.

Kasperson, R. E., Renn, O., Slovic, P., Brown, S., Emel, J., Goble, R., et al. (1988). The social amplification of risk: A conceptual framework. *Risk Analysis, 8*, 177-187.

Kenny, D. A., Kashy, D. A., & Bolger, N. (1998). Data analysis in social psychology. In D. Gilbert, S. Fiske & G. Lindszey (Eds.), *Handbook of social psychology* (pp. 233-265). Boston, MA: McGraw-Hill.

Kiesler, S. (1986, January - February). The hidden messages in computer networks. *Harvard Business Review,* 46-54, 58-60.

Kiesler, S., Siegel, J., & McGuire, T. W. (1984). Social psychological aspects of computer-mediated communication. *American Psychologist, 3*, 1123 - 1134.

Kogan, N., & Wallach, M. A. (1967). Risky shift phenomenon in small decision-making groups: A test of the information exchange hypothesis. *Journal of Experimental Social Psychology, 3*, 75-84.

Kraemer, K. L., & Pinsonneault, A. (1990). Technology and groups: assessments of the empirical research. In J. Galegher, R. Kraut & C. Egido (Eds.), *Intellectual teamwork: Social and technological foundations of cooperative work* (pp. 373-405). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Lamm, H. (1967). Will an observer advise higher risk taking after hearing a discussion of the decision problem? *Journal of Personality and Social Psychology, 6*, 467-471.

Laughlin, P. R. (1980). Social combination processes of cooperative problem-solving groups on verbal intellective tasks. In M. Fishbein (Ed.), *Progress in social psychology* (pp. 127-155). Hillsdale, NJ: Erlbaum.

Laughlin, P. R., & Earley, P. C. (1982). Social combination models, persuasive arguments theory, social comparisons theory, and choice shift. *Journal of Personality and Social Psychology, 42*, 273-280.

Lea, M., & Spears, R. (1991). Computer-mediated communication, deindividuation and group decision-making. *International Journal of Man-Machine Studies, 34*, 283-301.

Lea, M., & Spears, R. (1992). Paralanguage and social perception in computer-mediated communication. *Journal of Organizational Computing, 2*, 321-341.

Lee, E. J. (2006). When and how does depersonalization increase conformity to group norms in computer-mediated communication. *Communication Research, 33*, 423-447.

Lee, E. J. (2007). Deindividuation effects on group polarization in computer-mediated communication: The role of group identification, public self-awareness and perceived argument quality. *Journal of Communication, 57*, 385-403.

Lee, E. J. (2008). When are strong arguments stronger than weak arguments: Deindividuation effects on message elaboration in computer-mediated communication. Paper presented at the 58th Annual International Communication Association Conference, San Francisco, USA.

Lee, E. J., & Nass, C. (2002). Experimental tests of normative group influence and representation effects in computer-mediated communication: When interacting via computers differs from interacting with computers. *Human Communication Research, 28*, 349-381.

Levine, J. M., & Moreland, R. L. (1998). Small groups. In D. T. Gilbert , S. T. Fiske & G. Lindzey (Eds.), *Handbook of social psychology* (pp. 415-469). New York: McGraw-Hill.

Levinger, G., & Schneider, D. J. (1969). Test of the "risk is a value" hypothesis. *Journal of Personality and Social Psychology, 11*, 165-170.

Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, E. S. (2001). Risk as feelings. *Psychological Bulletin, 127*, 267-286.

Mackie, D. M. (1986). Social identification effects in group polarization. *Journal of Personality and Social Psychology, 50*, 720-728.

Matheson, K. (1991). Social cues in computer-mediated communication negotiations: Gender males a difference. *Computers in Human Behavior, 7*, 137-145.

Mayer, M. E. (1985). Explaining choice shift: An effects coded model. *Communication Monographs, 52*, 92-101.

McGrath, J. E. (1984). *Groups: interaction and performance*. Englewood Cliffs, NJ: Prentice-Hall.

McGrath, J. E., & Hollingshead, A. (1993). Putting the "group" back in group support systems: Some theoretical issues about dynamic processes in groups with technological enhancements. In L. M. Jessup & J. S. Valacich (Eds.), *Group support systems* (pp. 78-96). New York: Macmillan.

McGuire, T., Kiesler, S., & Siegel, J. (1987). Group and computer-mediated discussion effects in risk decision-making. *Journal of Personality and Social Psychology, 52,* 917-930.

McLeod, P. L., Baron, R. S., Marti, M. W., & Yoon, K. (1997). The eyes have it: Minority influence in fact-to-face and computer-mediated group discussion. *Journal of Applied Psychology, 82*, 706-718.

Miller, C. E. (1985). Group decision-making under majority and unanimous decision rules. *Social Psychology Quarterly, 48*, 51-61.

Miranda, S. M. (1994). Avoidance of groupthink : Meeting management using group support systems. *Small Group Research, 25*, 105-136.

Moscovici, S., & Zavalloni, M. (1969). The group as a polarizer of attitudes. *Journal of Personality and Social Psychology, 46*, 575-586.

Myers, D. G., & Lamm, H. (1976). The group polarization phenomenon. *Psychological Bulletin, 83,* 602-627.

Nemeth, C. J. (1977). Interaction between jurors as a function of majority vs unanimity decision rules. *Journal of Applied Social Psychology, 7*, 38-56.

Petty, R. E., Cacioppo, J. T., & Goldman, R. (1981). Personal involvement as a determinant of argument-based persuasion. *Journal of Personality and Social Psychology, 41*, 847-855.

Petty, R. E., Priester, J. R., & Brinol, P. (2002). Mass media attitude change: Implications of the elaboration likelihood model of persuasion. In J. Bryant & D. Zillman (Eds.), *Media effects: advances in theory and research*. Mahwah, NJ: Lawrence Erlbaum Associates.

Pew Internet Project (2004). Online activities - daily Internet activities. Retrieved 11 February, 2008 from http://www.pewinternet.org/trends/Internet_Activities_4.23.04.htm

Pew Internet Project (2007). Pew Internet & American Life Project Tracking Surveys. Retrieved 22 April, 2008, from http://www.pewinternet.org/trends.asp

Pickerill, J. (2001). Weaving a green web: Environmental protest and computer-mediated communication in Britain. In F. Webster (Ed.), *Culture and politics in the information age*. London: Routledge.

Postmes, T., Haslam, A., & Swaab, R. I. (2005). Social influence in small groups: An interactive model of social identity formation. *European Review of Social Psychology, 16*, 1-42.

Postmes, T., & Spears, R. (1998). Deindividuation and anti-normative behaviour: A meta-analysis. *Psychological Bulletin, 123*, 238-259.

Postmes, T., Spears, R., & Lea, M. (1998). Breaching or building social boundaries? SIDE-effects of computer-mediated communication. *Communication Research, 25*, 689-715.

Postmes, T., Spears, R., & Lea, M. (2000). The formation of group norms in computer-mediated communication. *Human Communication Research, 26*, 341-371.

Postmes, T., Spears, R., & Lea, M. (2002). Intergroup differentiation in computer-mediated communication: Effects of depersonalization. *Group Dynamics: Theory Research and Practice, 6*, 3-16.

Preece, J., & Ghozati, K. (2000). Experiencing empathy online. In J. E. Katz (Ed.), *The internet and health communication: experience and expectations* (pp. 237-260). Thousand Oaks, CA: Sage.

Pruitt, D. G. (1971). Choice shifts in group discussion: An introductory review. *Journal of Personality and Social Psychology, 20*, 339-360.

Rabow, J., Fowler, F. J., Bradford, D. L., Hofeller, M. A., & Shibuya, Y. (1966). The role of social norms and leadership in risk-taking. *Sociometry, 29*, 16-27.

Reicher, S. (1984). Social influence in the crowd: Attitudinal and behavioural effects of deindividuation in conditions of high and low group salience. *British Journal of Social Psychology, 23*, 341-350.

Reicher, S., Spears, R., & Postmes, T. (1995). A social identity model of deindividuation phenomenon. In W. S. M. Hewstone (Ed.), *European review of social psychology* (pp. 161-198). Chichester, UK: Wiley.

Rodgers, S., & Chen, Q. (2005). Internet community group participation: Psychosocial benefits for women with breast cancer [Electronic Version]. *Journal of Computer-Mediated Communication*, *10*. Retrieved 8 April, 2008 from http://www.blackwell-synergy.com/doi/full/10.1111/j.1083-6101.2005.tb00268.x.

Rottenstreich, Y., & Hsee, C. K. (2001). Money, kisses and electric shocks: On affective psychology of probability weighting. *Psychology Science, 12*, 185-190.

Sanders, G. S., & Baron, R. S. (1977). Is social comparison irrelevant for producing choice shifts? *Journal of Experimental Social Psychology, 13*, 303-314.

Sassenberg, K., & Boos, M. (2003). Attitude change in computer-mediated communication: Effects of anonymity and category norms. *Group Processes and Intergroup Relations, 6*, 405-422.

Savicki, V., Kelly, M., & Lingenfelter, D. (1996). Gender, small group composition, and task type in small task groups using computer-mediated communication. *Computers in Human Behavior, 12*, 549-565.

Scott, A., & Street, J. (2000). From media politics to e-protest. *Information, Communication, and Society, 3*, 215-240.

Sherif, M. (1967). *Social interaction: processes and products.* Chicago: Aldine.

Shumate, M., & Dewitt, L. (2008). The North/South divide in NGO hyperlink networks. *Journal of Computer-Mediated Communication, 13*, 405-428.

Shumate, M., & Pike, J. (2006). Trouble in a geographically distributed virtual network organization: Organizing tensions in continental direct action network. *Journal of Computer-Mediated Communication, 11*, 802-824.

Sia, C. L., Tan, B. C. Y., & Wei, K. K. (2002). Group polarization and computer-mediated communication: Effects of communication cues, social presence, and anonymity. *Information Systems Research, 13*, 70-90.

Siegal, J., Dubrovsky, V. J., Kiesler, S. B., & McGuire, T. (1986). Group processes in computer-mediated communication. *Organizational Behavior and Human Behavior Processes, 37*, 157 - 187.

Silverthorne, C. P. (1971). Information input and the group shift phenomenon in risk taking. *Journal of Personality and Social Psychology, 20*, 456-461.

Singer, J. (1988). Using SAS PROC MIXED to fit multilevel models, hierarchical models, and individual growth models. *Journal of Educational and Behavioral Statistics 24*, 323-355.

Singleton, R. (1979). Another look at the conformity explanation of group induced shifts in choice. *Human Relations 32*, 37-56.

Slovic, P. (1987). The perception of risk. *Science, 236*, 280-285.

Slovic, P. (1992). Perception of risk: Reflections on the psychometric paradigm. In S. Krimsky & D. Golding (Eds.), *Social theories of risk*. Westport, CT: Praeger Publishers.

Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G. (2004). Risk as analysis and risk as feelings: Some thoughts about affect, reason, risk, and rationality. *Risk Analysis, 24*, 311-322.

Slovic, P., Fischhoff, B., & Lichtenstein, S. (1979). Rating the risks. *Environment, 21*(3), 14-20, 36-39.

Snijders, B., & Bosker, R. J. (1999). *Multilevel analysis: an introduction to basic and advance multilevel modeling*. London: SAGE Publications Ltd.

Spears, R., & Lea, M. (1992). Social influence and the influence of the 'social' in computer-mediated communication. In M. Lea (Ed.), *Context of computer-mediated communication* (pp. 30-65). Hertfordshire, England: Harvester Wheatsheaf.

Spears, R., & Lea, M. (1994). Panacea or panoptican: The hidden power in computer mediated communication. *Communication Research, 2*, 427-459.

Spears, R., Lea, M., & Lee, S. (1990). De-individuation and group polarization in computer-mediated communication. *British Journal of Personality and Social Psychology, 37*, 1660-1672.

Sproull, L., & Kiesler, S. (1991). *Connections: new ways of working in the networked organization*. Cambridge, MA: MIT Press.

Stoner, J. A. F. (1968). Risky and cautious shifts in group decisions: The influence of widely held norms. *Journal of Experimental Social Psychology, 4*, 442-459.

Tajfel, H. (1978). Individual behavior and intergroup behavior. In H. Tajfel (Ed.), *Differentiation between groups: studies in the social psychology of intergroup relations* (pp. 27-60). London: Academic Press.

Taylor, J., & MacDonald, J. (2002). The effects of asynchronous computer-mediated group interaction on group processes. *Social Science Computer Review, 20*, 260-274.

Turner, J. C. (1991). *Social influence*. Pacific Grove, CA: Brooks/Cole.

Turner, J. C., Hogg, M. A., Oakes, P. J., Reicher, S. D., & Wetherell, M. S. (1987). *Rediscovering the social group: a self-categorization theory*. Oxford, UK: Basil Blackwell.

Valacich, J. S., Jessup, L. M., Dennis, A. R., & Nunamaker, J., F,. (1992). A conceptual framework of anonymity in group support systems. *Group Decision and Negotiation, 1*, 219-241.

Vinokur, A., & Burnstein, E. (1974). Effects of partially shared persuasive arguments on group induced shifts. *Journal of Personality and Social Psychology, 29*, 305-315.

Vinokur, A., & Burnstein, E. (1974a). Novel argumentation and attitude change: The case for polarization following discussions. *European Journal of Social Psychology, 8*, 335-348.

Wallach, M. A., Kogan, N., & Bem, D. J. (1962). Diffusion of responsibility and level of risk taking in groups. *Journal of Abnormal and Social Psychology, 68*, 263-274.

Walther, J. B. (1992). Interpersonal effects in computer-mediated interaction: A relational perspective. *Communication Research, 19*, 52-90.

Walther, J. B. (1996). Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction. *Communication Research, 23*, 3-43.

Walther, J. B. (1997). Group and interpersonal effects in international computer-mediated collaboration. *Human Communication Research, 23*, 1-43.

Walther, J. B., & Boyd, S. (2002). Attraction to computer-mediated social support. In C. A. Lin & D. Atkin (Eds.), *Communication technology and society: audience adoption and uses* (pp. 153-188). Cresskill, NJ: Hampton Press.

Walther, J. B., Loh, T., & Granka, L. (2005). Let me count the ways: The Interchange of verbal and nonverbal cues in computer-mediated and face-to-face affinity. *Journal of Language & Social Psychology, 24*, 36-65.

Walther, J. B., & Parks, M. R. (2002). Cues filtered out, cues filtered in: Computer mediated communication and relationships. In M. L. Knapp, J. A. Daly & G. R. Miller (Eds.), *The handbook of interpersonal communication*. Thousand Oaks, CA: Sage.

Walther, J. B., Wang, Z., & Loh, T. (2004). The effect of top-level domains and advertisements in health web-site credibility. *Journal of Medical Internet Research, 6.* Retrieved 11 February, 2008 from http://www.jmir.org/2004/3/e24/

Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist, 35,* 151-175.

Zuber, J. A., Crott, H. W., & Werner, J. (1992). Choice shift and group polarization: An analysis of the status of arguments and social decision schemes. *Journal of Personality and Social Psychology, 62*, 50-61.